

REBUILDING THE BRITISH AIR FORCE

MODEL

AIRPLANE NEWS

MARCH 1938

20¢



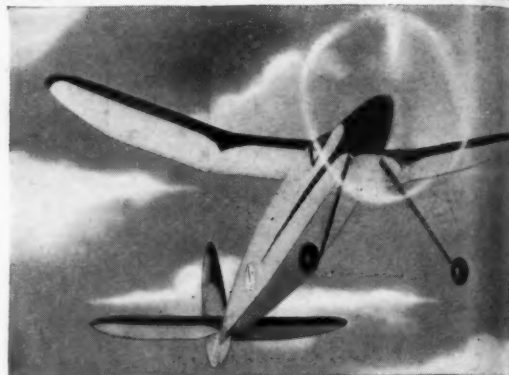
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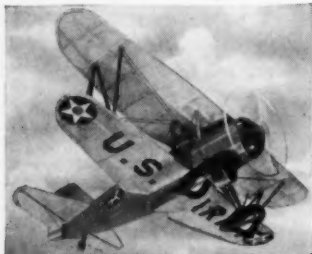


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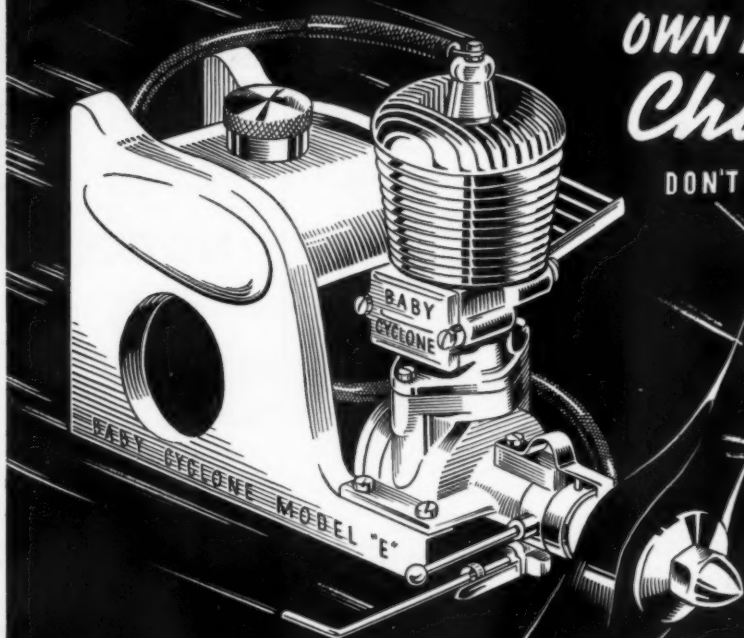
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Model AIRPLANE News

9th YEAR OF PUBLICATION

VOL. XVIII

No. 3

Edited by Charles Hampson Grant

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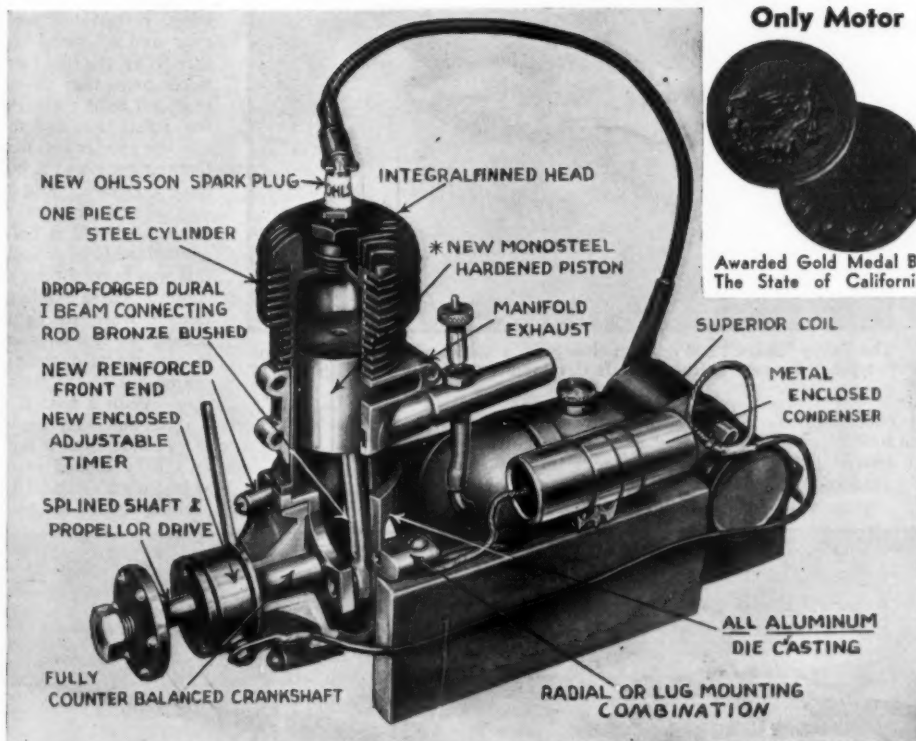
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The Bristol Blenheim Bomber, the plane that initiated the new building program, with two 800 hp. engines. (Bristol Aero Co.)

Rebuilding the British Air Force

How Britain Has Changed Completely the Types of Its First Line Airplanes and Is Working Day and Night to Create an Impregnable Air Force

By E. J. BULBAN

SEVERAL months ago there appeared in various magazines, photographs of a new low-wing fighter bearing British markings and later identified as a Hawker product, reputed to have a top speed of more than 300 m.p.h. and perfect maneuverability. "Ha, another English monoplane experiment," we laughed. "Can't they forget what happened to the low-wing Bristol and Supermarine Spitfire I?? This job won't get far." But extraordinary things began to happen. Other new types, bombers, observation, transports and the rest all appeared with the same characteristic monoplane, all-metal structure and most of these had retractable landing gears, cowl flaps and controllable pitch propellers. At the same time appropriations for the Air Force soared tremendously. What was the cause of all this?



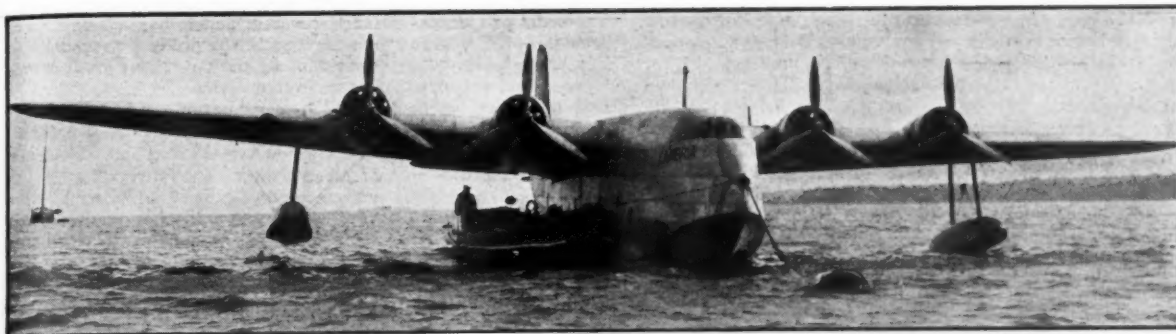
The Fairey "Battle" 300 m.p.h. fighter with a 1065 hp. Rolls-Royce engine typifies the new British aircraft development. (Fairey Aviation Co.)

It all started when a certain Lord Rothermere had his pet transport, designed to his specifications, quietly flown to Martlesham Heath for its Certificate of Airworthiness (similar to our Approved

Type Certificate). As it rolled up to the hangars and stopped it was instantly surrounded by a gathering of curious pilots and officials. Disdainfully they examined its monoplane wing, retractable landing gear and all-metal structure. Why, the thing would never pass, they thought; it wasn't built right. Put a few struts here and there, another rudder and fix the landing gear and it might have a chance. And anyway, of what practical military use could it be? A monoplane bomber such as this was beyond their conception. These astute gentlemen were to be surprised. A few days later, motors warmed, the plane taxied out on the far runway. With a roar it was away in such a time that they couldn't believe their eyes. And landing it floated in like a feather. They looked at each other. Why, that just wasn't done!! Then the speed trials, which caused an echo to



Avro Ansons, bomber fighters in flight during maneuvers. Guns protect it fore and aft. (Globe)



The new Empire Flying Boat, Cambria, one of the forerunners of Britain's air power at sea. (Globe)

be heard round Britain and by the peacefully sleeping Air Ministry. What, 270 m.p.h. with only two 500 hp. engines!! Impossible, they cried, why there isn't a plane in service or under tests that can come near that! But the records bore faithful witness and Lord Rothermere departed, but without his transport. That remained at Martlesham, now the property of the Air Ministry. After tests were over, the Bristol Aeroplane Company found itself with a nice big order for that particular ship on their hands.

At last the Air Ministry was awake and what they saw wasn't very pleasant. But buckling down to work they resolved to take the Air Force out of its deadly condition. Specifications were sent out that made the manufacturers' eyes blink when they saw them. But the thought of those nice juicy contracts calmed them quickly and they went to work. How are they working out this huge plan?

The industry is following wartime schedule on aircraft production. In fact so acute has the situation become, that a plan known as the Shadow Scheme has been evolved. This consists of a group of plants noted for their great experience in manufacturing and large output ca-



The Westland Cooperation (observation) plane with Bristol Mercury IX engine. (Courtesy Westland Aircraft Ltd.)



The Fairey "Swordfish" carrying a torpedo, is a standard Royal Navy plane. (Fairey Aviation Co.)

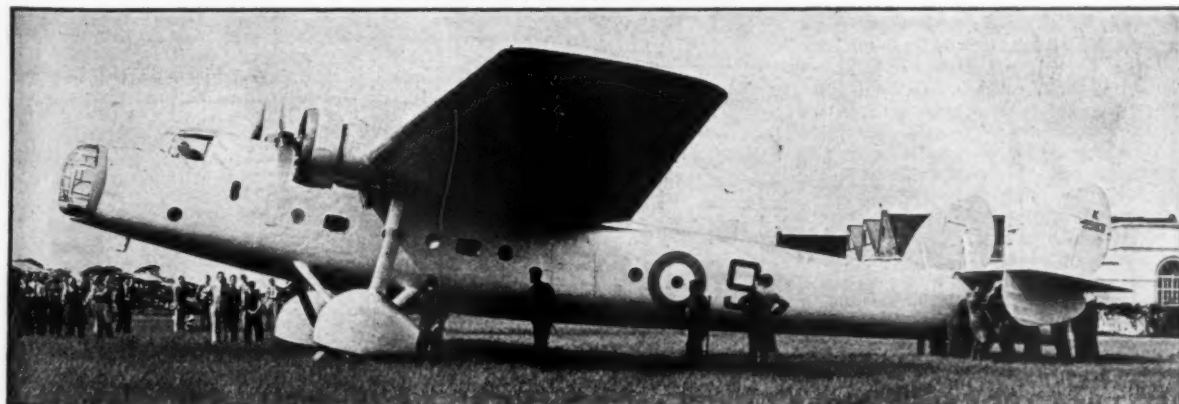
capacity, to build (in time of war) airplane parts and motors which the ordinary industry alone could not supply. These parts would then be assembled at a different place.

Due to this expansion program not many new commercial types have made their debut. The manufacturers have orders to finish their military contracts first. The R.A.F. is not wasting a minute. Enlargement of the ground personnel is also under way. Plans call for 1,512 more pilots and a total of 10,500 mechanics. Eleven training schools are working at top speed, twenty more are to be built and the government has mobilized thirteen civilian schools to aid them. A plan to train reserve pilots at selected flying clubs is also under way. Formerly the Air Force occupied 52 fields. Now five civilian airports have been taken over, six new ones built and sites for eighty-nine more acquired.

Balloon nets suspended at 18,000 feet are also being considered against bombers.

Turning to heavier-than-air defense we find that the new models are being ordered practically off the drawing boards.

The Naval Arm is also getting its share of new equipment. Two new carriers, the Illustrious and



The Bristol Bomber Transport type 130. 24 fully armed troops may be carried. (Bristol Aero Co.)

the Victorious, are now under construction, with large quantities of Fleet fighters scheduled for quick delivery this year. What are some of these planes like, that are so popular?

The Hawker "Hurricane I" and the Supermarine "Spitfire II" are both typical of the new trend in English fighters. Both are low-wing monoplanes of all-metal stressed skin construction with retractable landing gears and covered cockpits. Though the Hawker was partly fabric-

covered, the production model will be covered with metal. Each is powered with the new R.R. Merlin V-12 engine of 1,065 hp. Their maximum speed is well over 300 m.p.h. though the Spitfire is said to be a shade faster.

In this display of monoplanes we find a touch of the conservative in the Gloster "Gladiator" which is the only biplane fighter on order. It has a Bristol Mercury VI, geared and supercharged of 825 hp. The fuselage, wings and tail are of metal,

fabric-covered, and it has a single strut landing gear. The production model will have flaps on the upper and lower wings and a covered cockpit.

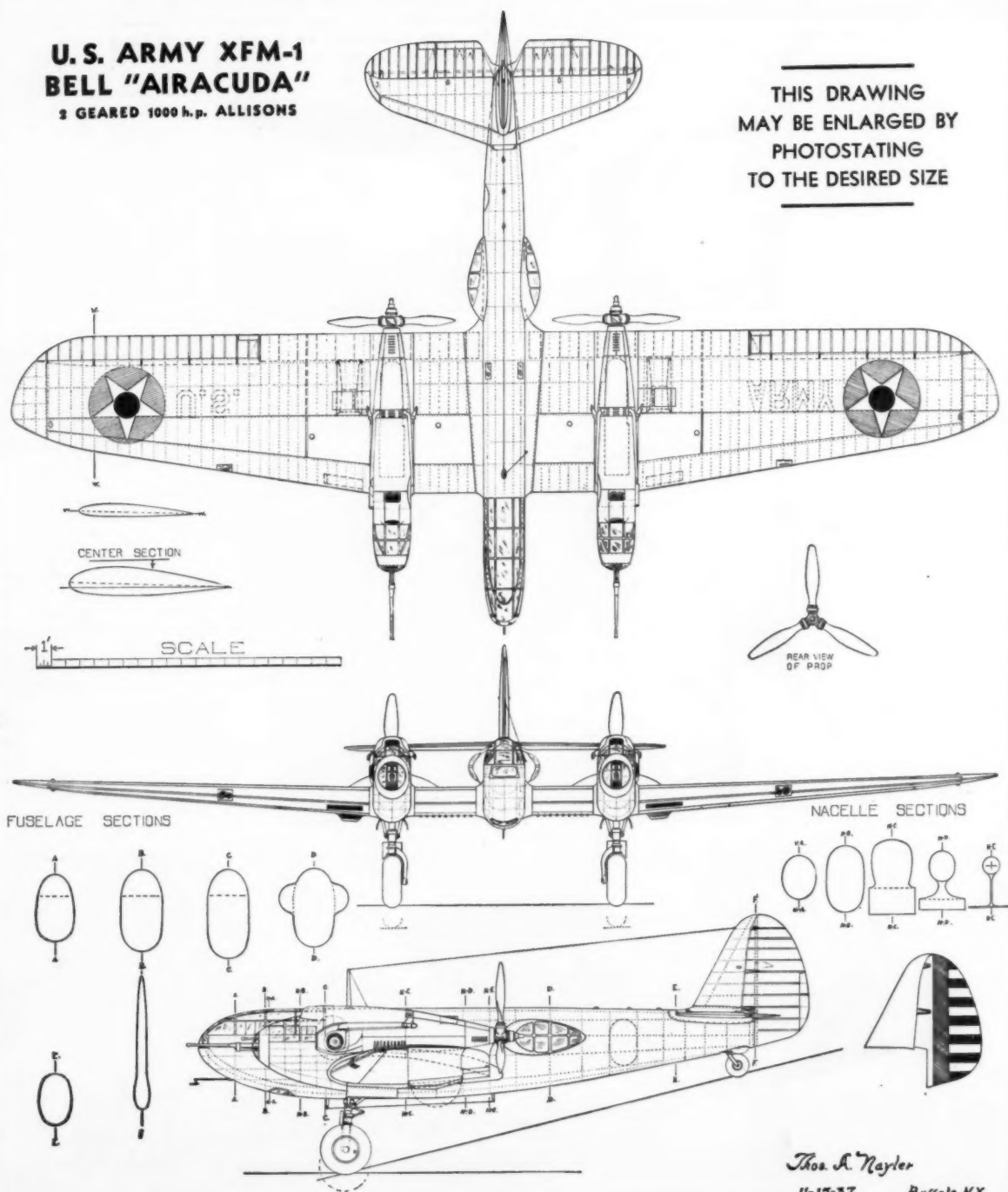
The Fairey "Battle" with 1,065 hp. is familiar to all and is probably the forerunner of a new type in England. However, at present there is a Fairey "Battle Jr." undergoing tests. It closely resembles the "Battle" but has a six foot smaller wingspan and has the landing gear folding

(Continued on page 52)

U.S. ARMY XFM-1 BELL "AIRACUDA"

2 GEARED 1000 h.p. ALLISONS

THIS DRAWING
MAY BE ENLARGED BY
PHOTOSTATING
TO THE DESIRED SIZE



Thos. A. Naylor

11-1537

Buffalo, N.Y.

Your Career As An Aeronautical Draftsman

How an Aeronautical Draftsman May Become Proficient in His Field and Qualify for Executive Positions

By WILLIS L. NYE

DRAFTING is the basis of all engineering design and technical investigation of structure. It follows that all good draftsmen are engineers but that all good engineers are not always draftsmen in the true sense of the word. The average engineer who is a skilled draftsman is a rare individual. By this it is meant an individual who can make a credible drawing. The reason for the decided lack of character of the drawing of the average engineer is that but so much time is available for study, and of this amount, practically all must be devoted to technical research and investigation. Thus but little time is available for drafting practice or study. Legible drafting and lettering can only be acquired through practice. Now this is all important because many persons who are only moderate in their engineering experience can secure a good position if their drawing is good while the experienced engineer is at a decided handicap unless he can draw well.

Drafting as a profession or career does not offer any greater advantage to the young man any more than any other branch of business. The profession is crowded at the present time with individuals who are only semi-proficient in their ability or experience yet these tend to keep skilled men only partially unemployed. Unfortunately the wages in the drawing profession are lower for the amount of technical knowledge and the responsibility necessary when compared to other branches of industry or business. Furthermore, the chance for an executive position is limited mainly to engineering. Statistics show that approximately 60 percent of modern executives have started on their career as accountants or clerks. Thus

there does exist a decided handicap which other branches of business do not have. At most the average draftsman who aspires to a higher bracketed salary is usually limited to sub-executive or a secondary departmental head. The basic requirement is experience above everything else.

The working conditions in the profession are highly competitive. It is, however, no more crowded than any other branch of industry. It resolves itself down to one thing. If for instance there are 6 men all equally qualified with the same experience for the same job, it is logical to assume that only one of these can be chosen to hold the executive job. This is indeed unfortunate and involves the forces beyond our control in many instances. The questions of seniority, personality, appearance and education enter into the acquisition of any executive position. The point to realize is that while there is plenty of room at the top of the profession, each and every one of us cannot all hold executive positions.

In the drafting profession, there exists the steadiness of wages and work. If one chooses to allay the desire to reach a high post and really dig in and work to build up a regular position on the staff, both personal and financial satisfaction can be attained. If an individual is the type who likes to be active, the drawing table is unsuitable for such a person. On the other hand, if the temperament of the person is such that he likes to execute neat skillful work, a desire to create and to be precise, then making one's living in this occupation will be a pleasure. Many persons



Workmen assembling the intricate structure of a Lockheed transport wing. Imagine the drawings required for this piece of work.

involved in drawing lack the essential qualities which make good draftsmen. Invariably they soon fall by the wayside as time marches on. Concentration and aptitude are vital factors. The essential qualifications are partly of talented origin and partly of acquired experience. Good clean legible drawing should be the goal of everyone involved in detailing. In addition to these requirements, should go speed and accuracy. In the modern industrial world, the person who takes longer than the average allotted time is soon eliminated. Factory drawings require good detailing, particularly so in airplane production. It is useless for the person who has no particular talent for this occupation to attempt to do this work for any length of time. Those without inherent ability for drawings do not as a rule ever make good detailers. The two factors which go hand in hand are mechanical and technical ability and drafting talent.

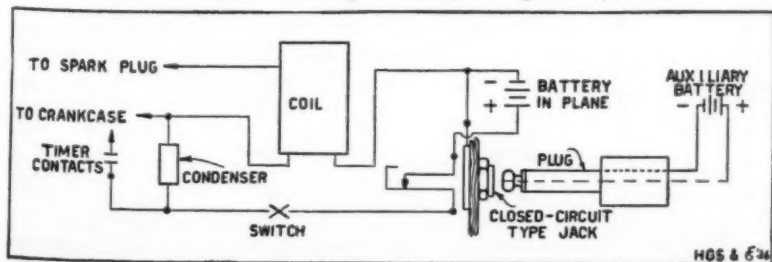
The way to become an expert detailer is to be able to sum up upon inspection, the problem that confronts one. Also is the ability to know what must be shown and what must be omitted; what is important and what is relatively unimportant. There are many detailers who persist in doing a vast amount of useless work. Learn to use and to make notes if the idea can be conveyed by that means upon the drawing. Take time to produce good-looking figures and dimensions. Study the value of contrasts by the use of lines. Block your details out so that the drawing presents a symmetrical appearance.

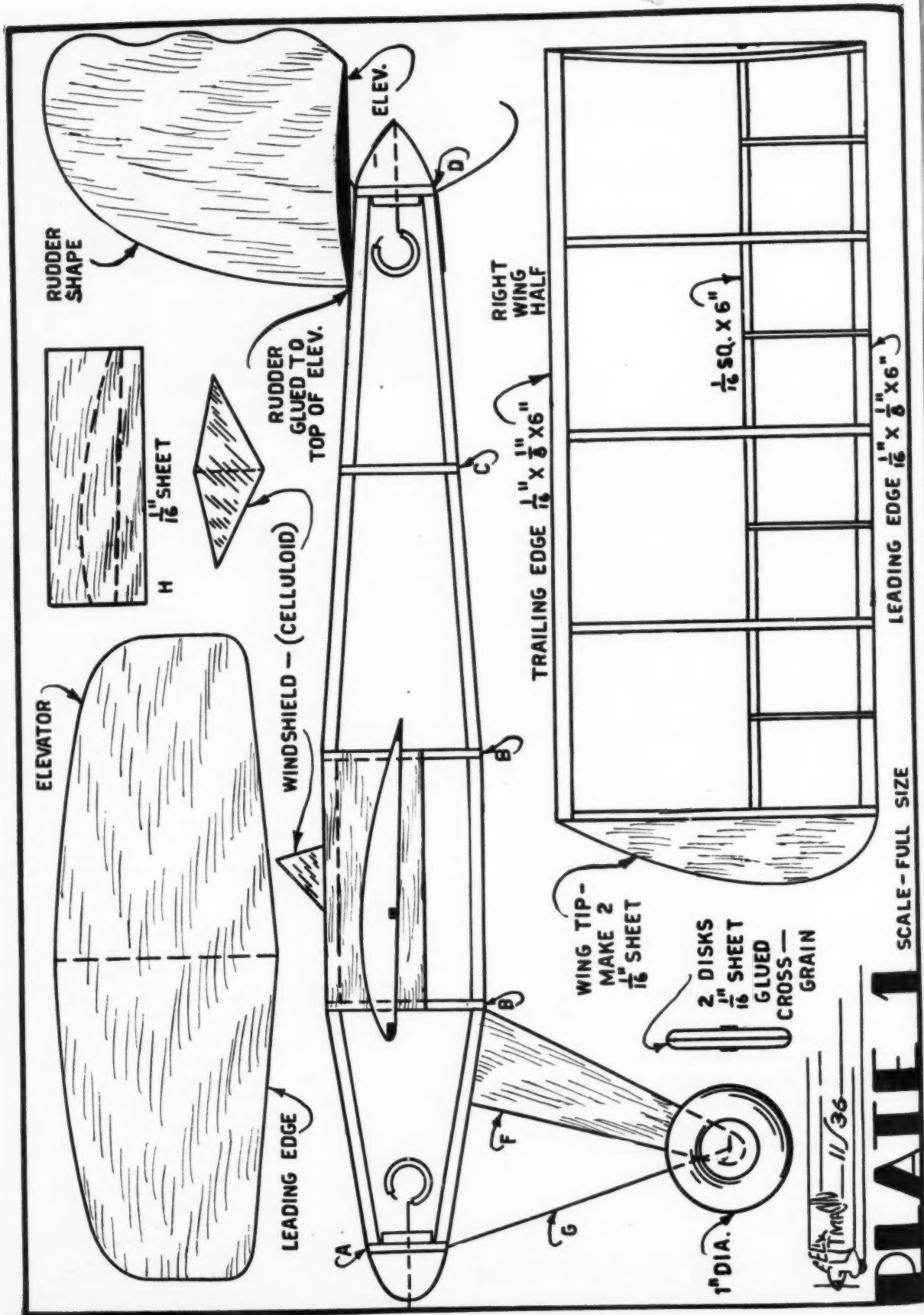
The basic knowledge of drafting is embodied in a pure engineering education which involves the science of mechanics and engineering. In many instances a period on the drawing board is served by apprentice technical men regardless of whether they will follow drafting or not. This is a valuable source of training because the ability to engineer and to draw is closely allied.

The general tendency is to use less and less drawings. The drawings are made in pencil on tracing paper. Cloth and ink are seldom used nowadays. Therefore it is imperative that good clean legible

(Continued on page 46)

Gas Model Starting Battery Plug-In System





Build the Baby Arrow Pleasure Plane

A Simple Sturdy Little Fuselage Model That Any Beginner Can Build and Fly Successfully—Just the Right Plane for Your Experiments

By D. A. RITTER

EVERY model builder has a dream of designing a simple plane which he can build in a few minutes and which will have a performance comparable with more complicated planes. Well, here is one of this type. A glance at the plans will show its simplicity and the appearance of the model in the pictures suggests its fine performance. The ship is very well designed for stability and you can be assured that it is an excellent flier. The ship is made almost entirely from 1/16" sheet balsa.

To start the construction first cut out the longitudinal stringers of the fuselage. These are sliced from 1/16" balsa sheet and are 1/8" wide. Next cut the twenty fuselage struts as shown in drawing No. 2. You will notice that the ends of the struts are beveled. This indicates that the sides of the longerons are parallel with the diagonals of the fuselage panels and not vertical with the sides.

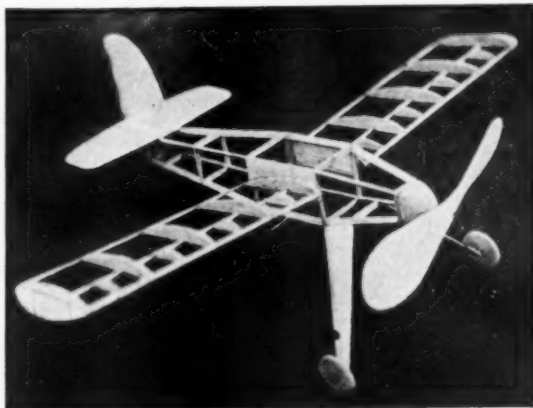
Next make the nose and tail plugs. When this is done you are ready to assemble the fuselage. The first step is to crease the longerons so that they will assume the angles shown in panel B. If they are wet this will be easy. Then cement the vertical and horizontal cross struts to the four longerons. Do this by making one side of the fuselage at a time and then connecting the two sides with the cross struts. Cement the longerons to the nose and tail plugs as indicated in the drawing.

From 1/16" sheet cut out the side fuselage panels H, to which the wings will be cemented. When this is done cement them in place to the fuselage struts, B, as shown in the assembly drawing. When

making the nose and tail plugs they may be cut from pieces of balsa 5/8" x 5/8" x 1/2".

The fuselage now may be covered with a good grade of Jap tissue and doped or sprayed with water. Do not cover the side pieces, H, but cut the paper to fit around them. Cement the paper to the front, rear and bottom edges of H.

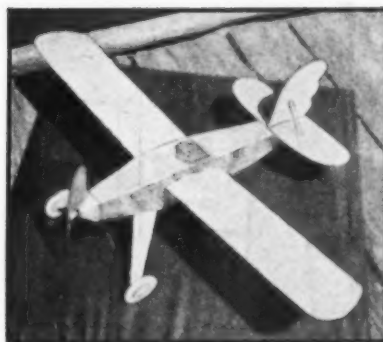
The landing gear comes next. Bend the wire, G, to the shape shown on plate No. 2



The framework is easy to construct and can be completed in a very short time.

and cut out the balsa struts, F, from 1/16" sheet. A small strut, D, is cemented between the two landing gear struts across the bottom of the fuselage from one longeron to the other. The picture of the uncovered skeleton shows this strut. The landing gear struts, G, are made from a piece of No. 12 music wire, bent as shown. The first step in assembling the landing gear is to cement the landing gear struts, F, to the longerons in the position shown in the assembly drawing. Next cement the wire, G, to the nose and pass the nose through the holes in the lower ends of the fuselage struts. Cement the wire to the balsa and attach with thread. When this is done two wheels may be made of 1/16" sheet balsa, glued together with the grain running at ninety degrees to each other. Fibre washers may be cemented on either side of the wheel around the hole.

It is a simple matter



The little plane that looks and acts like a big one.

then to put the wheels over the end of the landing gear shafts and fasten them in place by bending up the end of the wire or winding the end of the wire with a thin coat of cement. A piece of balsa should be cemented to the lower edge of the lower longerons immediately in front of the tail plug. To the bottom of this the tail skid is cemented after it is made from 1/32" diameter strong wire. The propeller shaft and rear hook are bent from No. 12 music wire. Rubber tubing may be slipped over the hooks to prevent the thin wire from cutting into the rubber motor.

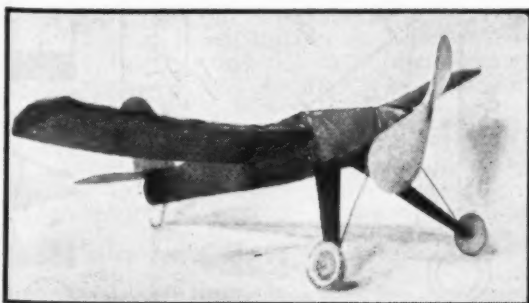
Around the holes in the front and rear of the nose plug two 1/8" brass washers are cemented in order to serve as a bearing and prevent the plug from wearing.

Next you can make the propeller. This is cut from the balsa block shown in plate No. 2. It is whittled out in the customary manner to make a right hand propeller. It can be painted with thin dope or banana oil if desired. This fills in the pores and makes the propeller stronger. Smear a little glue around the hole in the hub as this keeps the shaft from falling through after it is inserted and bent over at the front end of the propeller in order to secure it firmly. Before the shaft is inserted in the propeller a washer should be passed over it. When the shaft is in place the washer should be cemented to the rear face of the propeller.

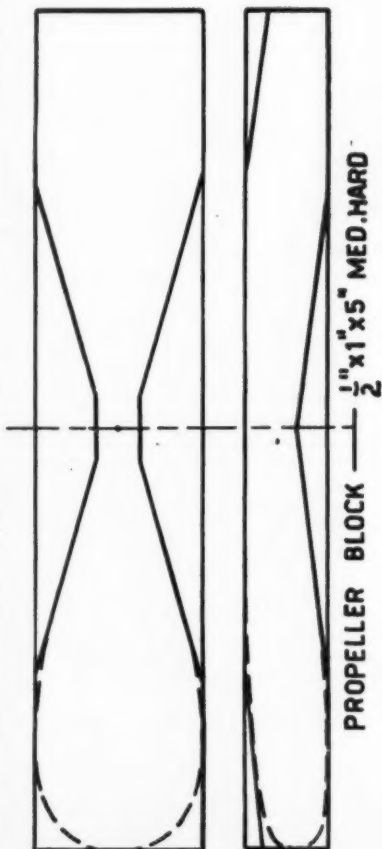
The tail assembly on this model is very simple to construct. Simply cut out the stabilizer and rudder from 1/32" sheet balsa and cement them to the fuselage as shown. Don't forget the stabilizer wedge (see plans) when attaching the tail assembly, as the stabilizer would have too much angle of incidence without it. After the rudder is glued upright on the stabilizer, it should be braced with rudder braces, which are made from 1/16" sq. bamboo. (See picture page 9.)

The motor should be installed next. About four strands of 3/32" or 1/8" flat rubber should be sufficient. String this between the propeller and tail skids. All we have left to build now is the wings. Drawing No. 1 clearly shows how the wings are built. Cover wings with Jap tissue and dope. Do not attach wings to fuselage until

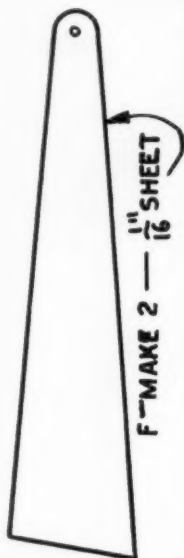
(Continued on page 54)



Its design insures excellent stability. The relatively large propeller provides a steep climb and snappy performance.



POWER: 2 STRANDS $\frac{1}{8}$ " FLAT BROWN LUBRICATED



C
MAKE-4



B
MAKE-8
ALL BRACES OF $\frac{1}{16}$ " SHEET



A&D
MAKE-8



FALSE RIB
MAKE-8
 $\frac{1}{32}$ " SHEET



FULL RIB MAKE 10 — $\frac{1}{16}$ " SHEET



E-MAKE 4 — $\frac{1}{16}$ " SHEET

TAIL HOOK



.028 WIRE

PROP SHAFT



.028 WIRE

$\frac{1}{2}$ SCALE

(FRONT VIEW)

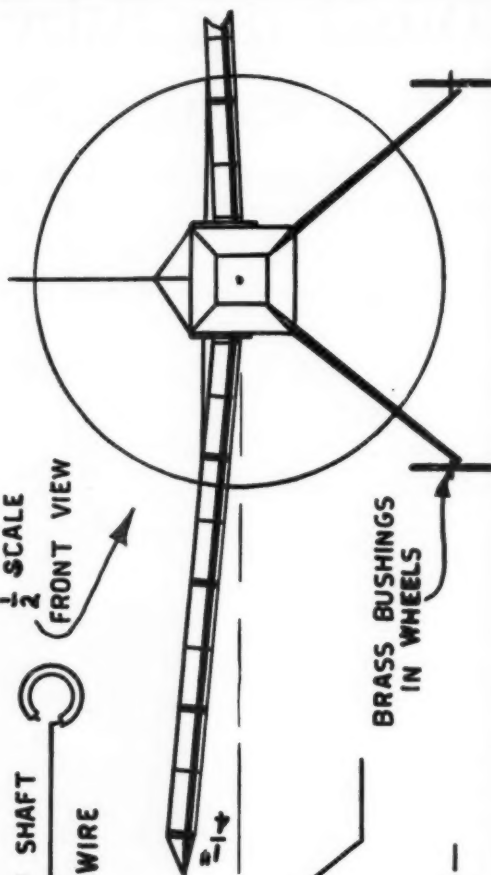


G

LANDING GEAR
BRIDGE—.028 WIRE

WIRE TAIL
SKID

REL. 11/36



BRASS BUSHINGS
IN WHEELS

SCALE FULL SIZE
EXCEPT WHERE NOTED—

PLATE 2

Designing Your Gas Model

Force Arrangements of Exact Scale Models, and How to Select the Types That Will Possess the Greatest Stability

Article No. 71

Chapter No. 5

By CHARLES HAMPSON GRANT

UNLIKE rubber-powered models, gas models may be built to the exact scale of some large plane without impairing the stability and proper arrangement of forces. As the C. of G. in rubber models is fixed; its position determined by the general design of the plane, the C.L.A. (center of lateral area) must be located in the correct position by the character or form of the fuselage outline and position of the fin.

Gas model designers are not faced with this difficulty. The C. of G. of a gas model may be changed to meet requirements by moving the batteries and coil to a position that will give the proper balance. This procedure was illustrated in the preceding article, using a typical fuselage model type as an example.

However, instead of originating some particular design a model builder may prefer to build a gas motor powered exact scale model of some large ship. If he understands the points which have been discussed in respect to proper force arrangement, he will be able to show great wisdom in choosing the type of plane that will be stable and efficient.

Let us look at Fig. 135, Diagram (F). Here we have a side elevation of a Rearwin Speedster. This outline is exactly the same as the large ship in all respects except that the wing has been given the proper amount of dihedral for a gas model and the landing gear has been lengthened in order to insure greater propeller clearance with the ground. This last characteristic also adds lateral area below the C.L.A. to compensate for the increased lateral area above the C.L.A. caused by dihedraling the wing. The first step is to draw an accurate outline of the plane as shown in the diagram, then lay out the proper force arrangement and determine the proper C.L.A. of this craft. Next, the thrust line should be drawn in. After drawing the horizontal line through the C.L.A. parallel to the thrust line, mark the center of gravity on this line

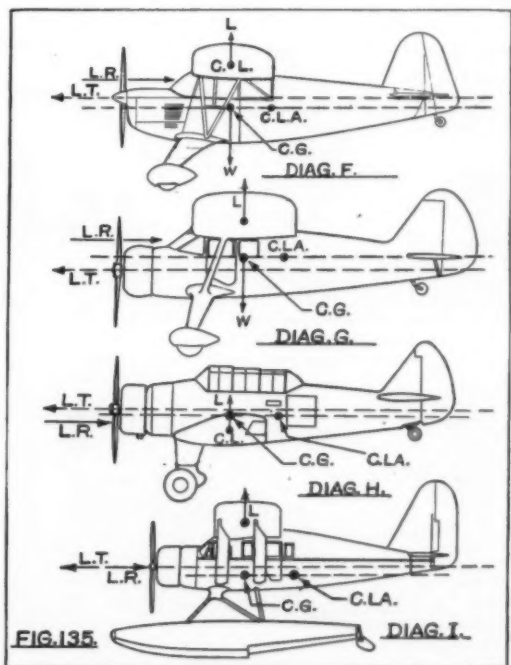
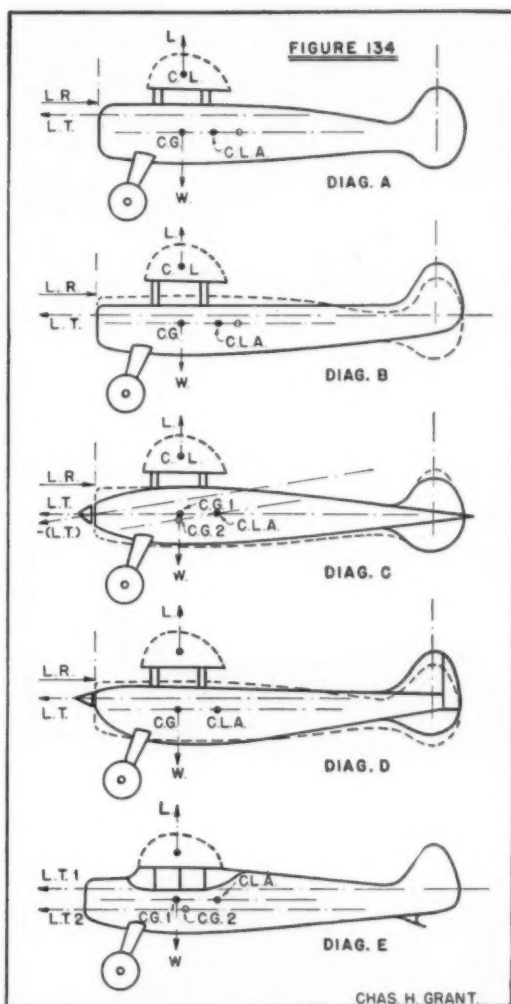
and directly below the midpoint of the wing. Its position is shown in the diagram. Now you will see that an excellent force arrangement exists. The thrust line is above the center of gravity and is considerably below the C.L.A. and above the C.G. This enhances pendulum stability. From an examination of the diagram you will see that the center of gravity is in a very convenient position.

When building your ship you will have no difficulty in establishing the center of gravity at the point indicated. Possibly in such a case the battery will have to be located approximately at a point on a level with the center of gravity providing an inverted motor is used. This type of power plant obviously will lend beauty to your craft to greater extent than a motor of upright variety. If you prefer to use this latter type, the batteries will have to be placed slightly below the center of gravity within the fuselage.

Now suppose we look at another scale side elevation. Diagram (G) represents the Stinson Reliant. The center of lateral area of such a ship is at the point shown when the wing has been given the correct amount of dihedral for a gas model. The line of thrust in the diagram has been drawn through the axis of the propeller and the center of gravity has been placed in its correct position relative to the C.L.A. Due to the extremely high fin the center of lateral area is quite high on the body. It is obvious from the diagram that the line of thrust passes below the center of gravity. Such a setup does not destroy stability but it does not possess stability to as great a degree as the ship in Diagram (A) and (F) for instance. In such a ship it would be wise to tilt the thrust line into a negative position as indicated in Diagram (G). By this means the thrust line will pass closer to the C.G. and will not induce a diving couple when the ship is gliding.

Do not assume that the C.G. will

(Continued on page 48)



Frontiers of Aviation

Latest Developments in Military and Commercial Aircraft Born of Rearmament Programs and Commercial Competition—How to Build a Scale Model of the Mayo Composite Aircraft

By ROBERT C. MORRISON



This Messerschmitt Bf-109 German pursuit, converted into a racer made a world's record of 379.66 m.p.h.

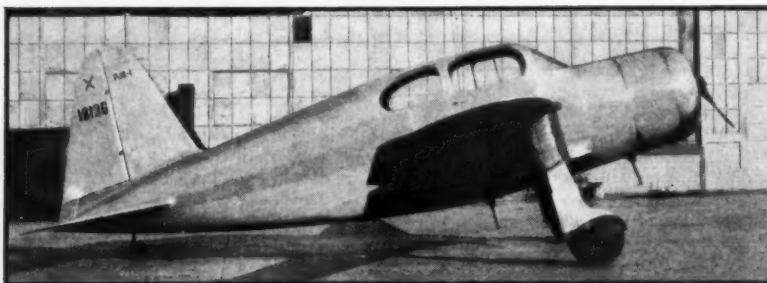
(Werkfoto BFW)



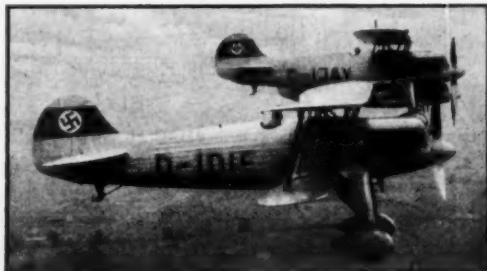
The Seversky two-place Convoy Fighter being flown for South American governments. (Morrison)



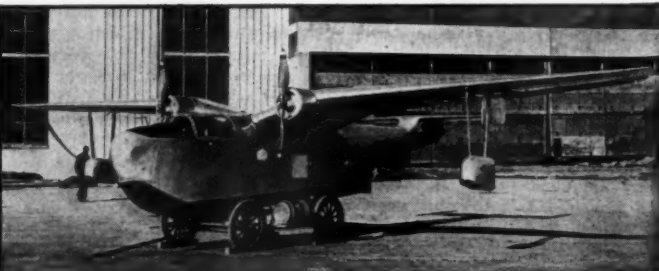
The Spartan Zeus 8W Attack-Bomber Trainer, with 525 hp. Wasp Jr. engine. (Larkins from Winkler)



The new four passenger PJC-1 powered with a 145 hp. Warner engine. (Morrison)



Heinkel pursuits flying in formation. This type is in use in Spain. (Kassel)



A test model, capable of carrying a pilot, of a new super seaplane to be built in the near future at the Martin plant. (Acme)

SOONER or later the steamship companies that carry passengers across the Atlantic are due for a "let down." As air transportation started to dig into the business of the railroads the railroads had no cause to be very much alarmed for they knew that it would be a long time before air passenger fares could be offered as low as those on the railroads, and then again the railroads have a very good safety record to back them up. It is safety that the traveller wants the most. However the high officials of American and foreign steamship lines who have been carrying passengers across the Atlantic for these many

years are confronted with a very different problem and a very serious one it is for them. They were warned many years ago of aviation's impending domination of the seas, and very little attention was given that warning. They have no brilliant safety record to show the public. In fact they have a very poor one considering all the facts. Then, according to Grover Loening's recent report to the Maritime Commission, the naval architect will have to pull miracles out of his hat if he is to design a modern passenger steamship, motor ship, or any other kind of ship that will surpass the economical operation of some of the passenger-carrying flying boats that will be built within the next five years. Then too, economy of operation means low fares!

Pan American Airways under the guidance of Juan Trippe and who has Grover Loening as one of his directors, has always been two or three steps ahead of its competitors. It was always Pan American that received the franchise in any bids for air routes where it was involved. Thus it was the lone instigator in showing the world the practical use of the flying boat in flying the Pacific and around South America. It is only fitting that Pan American Airways should now be foremost in her conquest of the Atlantic Ocean by air. However, her policy and habit of capturing the sole franchise for the route as far as an American airline is concerned is likely to result in a very bitter struggle. As a matter of fact the struggle is now going full blast and the chief opposition is a steamship line, the



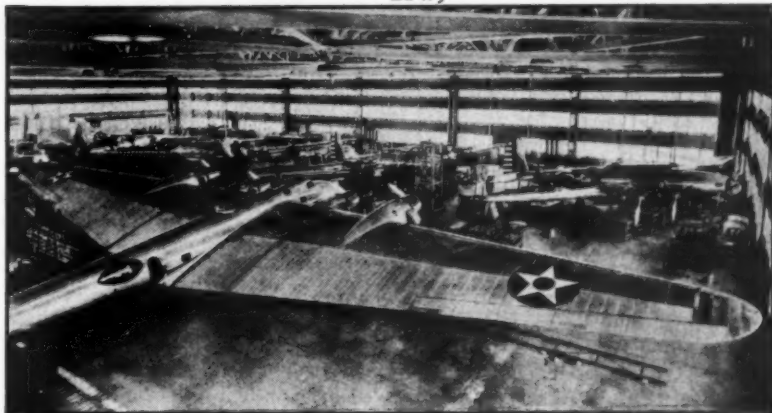
A nose view of the Bf-109 "pursuit."



A rear view of the Bf-109 which was converted into the racer Bf-113. (Werkfoto BFW)

American Export Company! And here is one high steamship official, Mr. W. H. Coverdale, president of American Export, who has been down at Glenn L. Martin's plant looking over the latest Martin Clipper that was just launched for the U.S.S.R. to see where they put the tail, where the engines were placed, and in general how a giant ocean flying boat is built. The speed, efficiency, etc., of forthcoming flying boats are now leaving their mark. Matson, Grace and the United States Lines are beginning to get air-minded, but still American Export dominates among the shipping lines, so much so that they are now having a giant 118,000 pound flying boat built by Glenn L. Martin! It is the same plane that we have referred to briefly in past issues. The design has now been completed and construction is now under way. According to information we have been able to obtain, the flying boat will have four very powerful engines in the leading edge of the full cantilever wing and will carry 100 passengers as a day plane—66 as a nighter. Its wingspread will be 188 feet! The wing, which will probably hold wing tip floats instead of sponsons, fair into the top of the hull in the conventional manner. The tail will be of the double-rudder type. Of tear drop design, the hull will have a blunt nose with the pilot sitting well up forward. As the bottom of the hull flows aft a v-shape will form at the bottom with the usual flying boat steps.

A fleet of these giants will give American Export a good foothold on trans-Atlantic air commerce not to mention the competition it will give Pan American Airways. The best procedure is undoubtedly to give air mail contracts to both lines, and after officials, politicians and manufacturers finally show some uniformity of opinions down in Washington, that will probably be the result. One section of the squabble that is now going on



Bombers in the course of construction at the Boeing plant. (Acme)

A Jap plane delivering its report via cylinder which catches on a wire between two poles on the ground. (Acme)

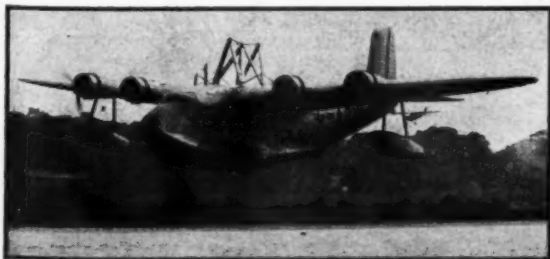


is who will take control of the airlines, the Maritime Commission or the I.C.C. Mr. Isaac M. Laddon, chief engineer of Consolidated Aircraft Corp., has become involved in this discussion mostly for the purpose of preventing a monopoly on transoceanic air travel and thus his company would have a larger field to work on in the sale of huge passenger air boats. Thus we have Consolidated as a serious contender in the building of commercial flying boats as well as Navy seaplanes.

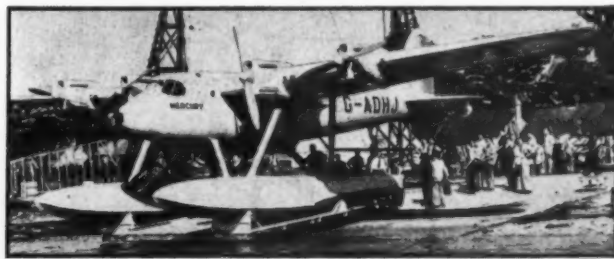
Just recently Consolidated received an

order for thirty-three VPB patrol bombers from the Navy to cost \$4,500,000. Their 110,000 pound Naval bomber is also progressing well.

(Continued on page 42)



The Maia, lower half of the Mayo Composite Aircraft on a test flight in England. (Globe)



The Mercury, the upper and high speed half of the Mayo Composite Aircraft being launched. (Globe)

LOWER COMPONENT
MAYO COMPOSITE
AIRCRAFT

STRUCTURE TO HOLD "MERCURY"

FIN

G-ADHK

STABILIZER

HULL

ELEVATOR

SCALE
FOUR FEET

NACELLE

-FLAP

A-A

COWLING

PROPELLER

AIRFOIL SECTIONS

E-E

WING

E

-AILERON

FIN

B-8

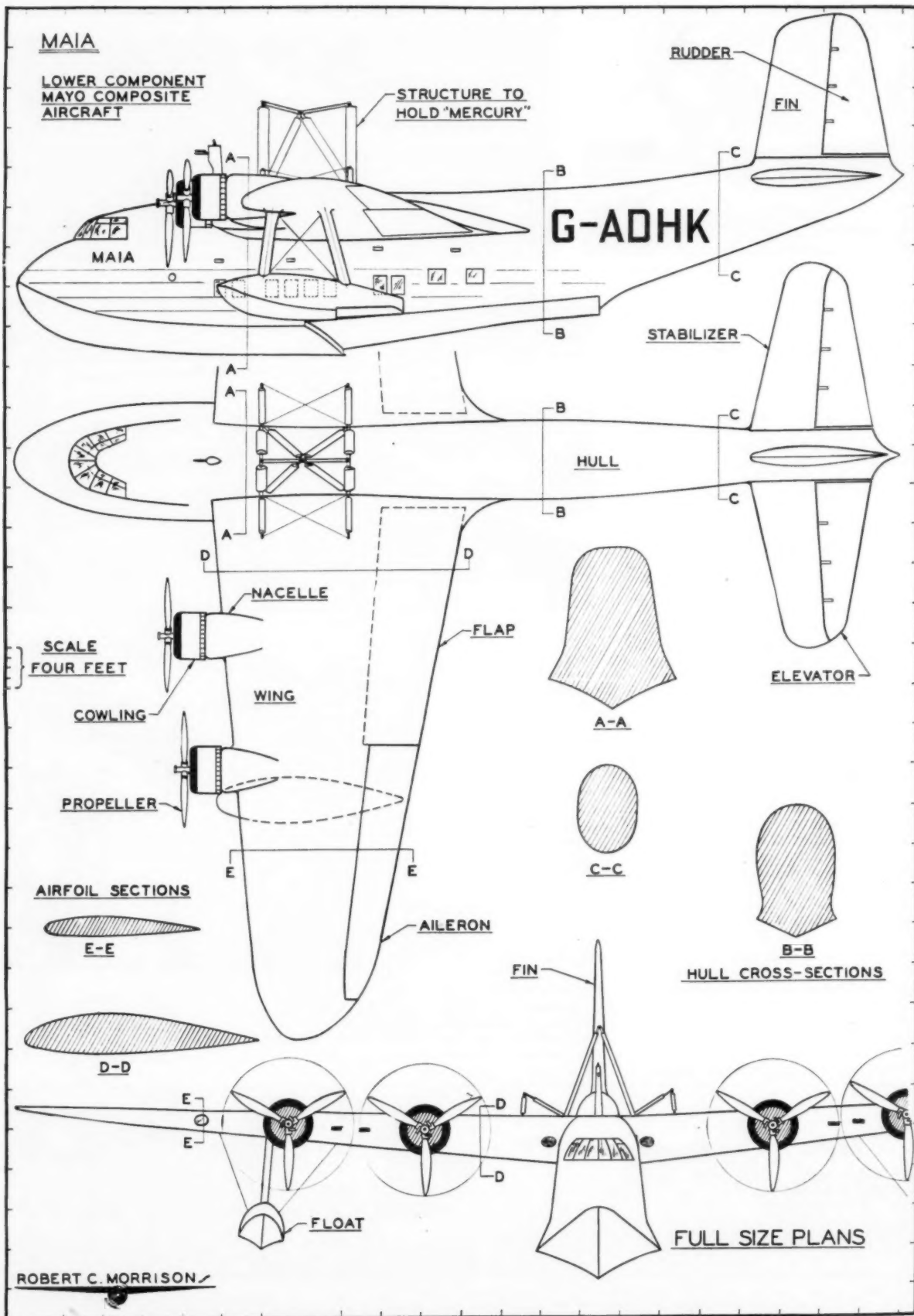
HULL CROSS-SECTIONS

D-D

Float

FULL SIZE PLANS

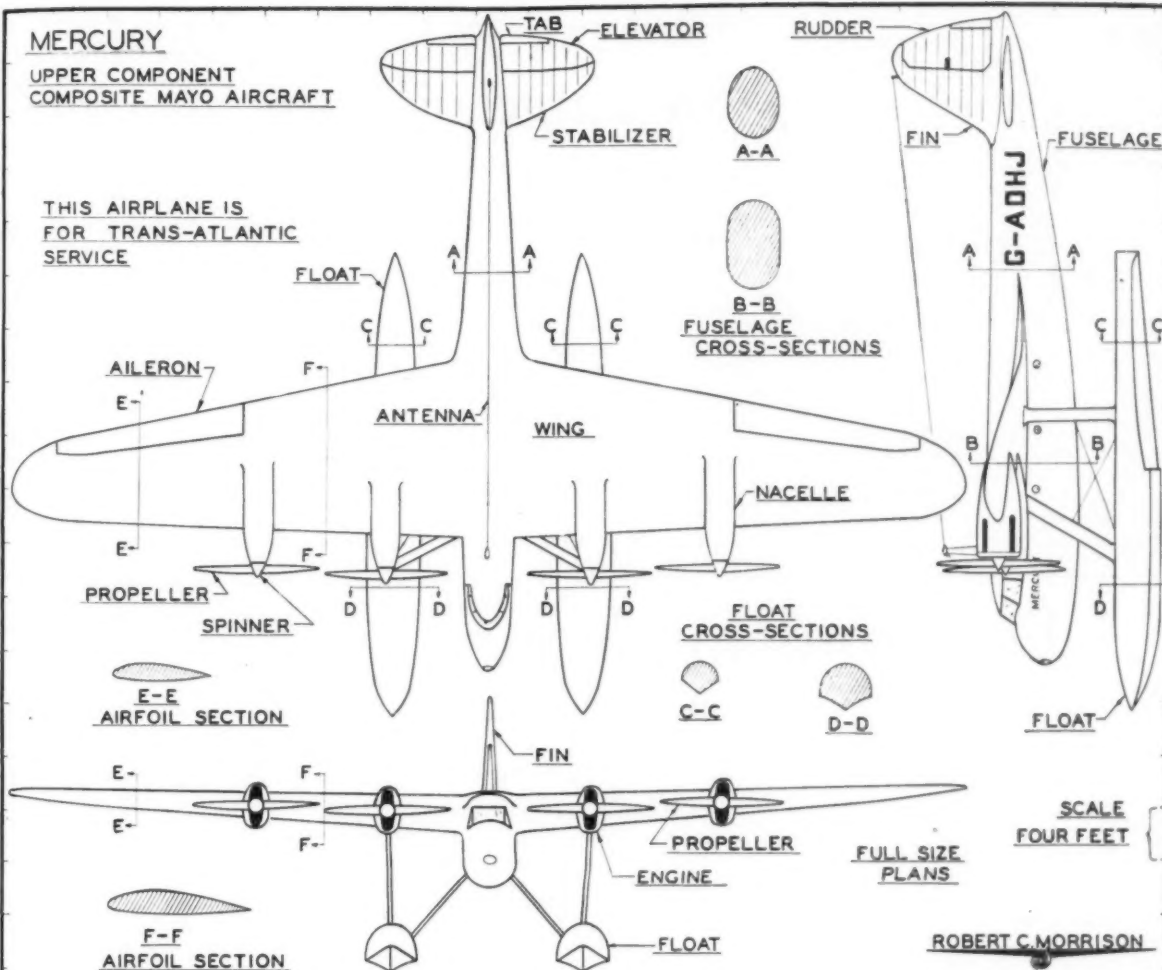
ROBERT C. MORRISON ✓



MERCURY

UPPER COMPONENT
COMPOSITE MAYO AIRCRAFT

THIS AIRPLANE IS
FOR TRANS-ATLANTIC
SERVICE



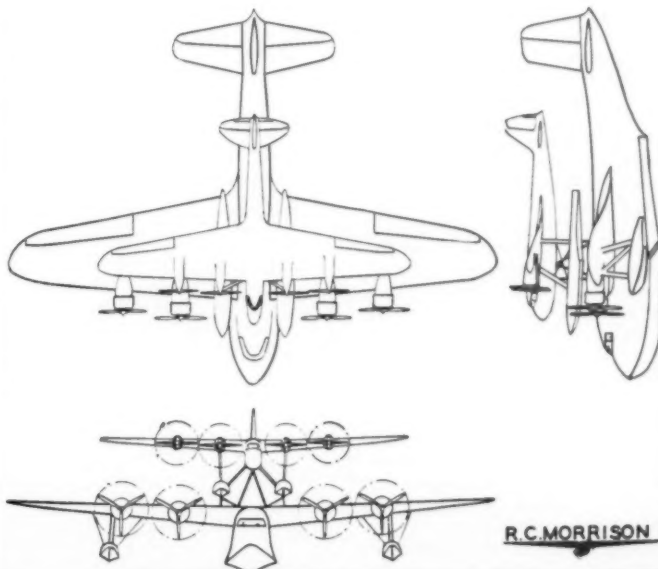
SPECIFICATIONS

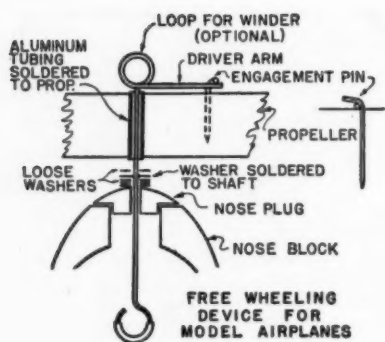
	MAIA BRISTOL PEGASUS X	MERCURY NAPIER RAPIER V
ENGINES		
MAX. HP.	3660	1360
WT. EMPTY	24000	10000
PAYLOAD	0	1000
GROSS WT.	27000	20500
WING LOADING	15.41	33.6
POWER LOADING	7.4	15.05
MAX. SPEED	200	207
CRUISING SPEED	165	180
LANDING SPEED	52	97.5 *
INITIAL CLIMB	1750''/min	500''/min
TIME TO 10000 FT	6	17.25
SERVICE CEILING	24000	21000
DURATION	1.25	21.2
RANGE	200	3800
PAINT JOB	WHITE	WHITE

* WITH FULL LOAD OF FUEL-LANDING
SPEED WOULD BE MUCH LOWER AT
END OF VOYAGE.

THESE FIGURES ARE ESTIMATED

ASSEMBLY-MAYO COMPOSITE AIRCRAFT





THIS device has been used on several of the author's models. It works as well on 24" models as it does on 50" ones. I have found it satisfactory in every way and the propeller is allowed to turn with a minimum of friction as soon as the motor is unwound.

The washer which is soldered to the

propeller shaft stands the whole pull of the motor. Thus the propeller is allowed to slide freely back and forth for a distance of about $\frac{1}{8}$ " to $\frac{1}{4}$ ". If the motor is wound by hand the propeller is slid forward and the engagement pin is made to engage the driver arm. As the prop is wound, the back pressure of the motor will automatically keep them engaged. When the model is in flight they will remain engaged as long as the driver arm exerts any force against the engagement pin. As soon as the motor is unwound and the driver arm stops, the engagement pin will slip away from it, since the propeller is now turned by the wind, and

air pressure will slide the propeller back against the fixed washer where it will be free to revolve during the rest of the glide.

The fixed washer is soldered on the shaft in such a position that when the propeller slides back against it the driver arm will just clear the engagement pin. The loose washer between the propeller and the fixed washer is merely to reduce friction.

If the motor is wound with a winder the propeller need not be engaged till the model is ready for launching. I think this free wheeling device is about as foolproof, simple to make, and hard to put out of commission as such a device can be.

Pontoons for Your Gas Model

By MANLEY MILLS

THESE pontoons can be attached in a few moments to practically any gas model without removing the original landing gear struts. The only addition necessary to the model itself is a brass tube attached across the underside of the fuselage directly behind the rear landing gear struts. This tube takes the ends of the extra pair of $\frac{1}{8}$ " wire struts. The latter are, of course, removed when you change back to the wheel gear.

Following typical model airplane construction, the pontoons are very easily built. They have no complicated curves in their design, the beam, or width, being the same from stern to stern, and the sides vertical. Quite a few lightplanes use pontoons of this type, by the way.

The framework of each pontoon consists of five $\frac{1}{8}$ " thick balsa formers, with $\frac{1}{8}$ " square stringers and diagonals. Covering is $\frac{1}{16}$ " balsa reinforced with silk or tissue, preferably the former.

The first thing to do is to make a full-size drawing of the side view and the formers, the latter being shown half-breadth in the accompanying plans. Cover the drawings with waxed paper before beginning work. Place down the stringers for one side, also the curved piece at the stern, and hold them in place with pins. Glue the formers in position, checking them with a square before they dry to see that they are vertical. When all joints are dry, install the diagonals on the side next to the board, then glue in the stringers and diagonals on the upper side. When both units are finished, let them dry thoroughly before applying the cover.

You will find it more convenient to apply the balsa covering

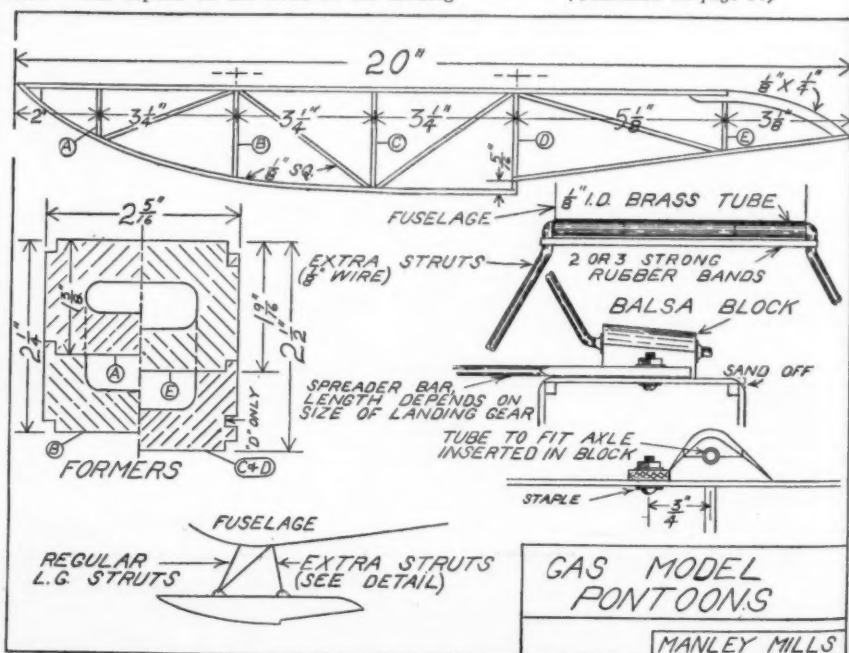
in several sections instead of using one large piece for each side. In such case, let the joints come at the formers. On the curved portions of the top and bottom, turn the wood so the grain runs crosswise and bending will be much easier. Before you glue on the deck, install the bolt that hold the spreader bars. To keep them from turning, bend small wire staples to fit in the screw slots, push them in place and apply cement over the heads of the bolts. The length of the spreader bars will depend on the tread of the landing

gear, which, on most gas models, is wide enough to insure stability on the water when floats are used.

The four mounting blocks are each made in two pieces. Before you cement the parts together, sand grooves for the brass tube bushings, which are glued in place. The blocks are cemented to the deck over stations "B" and "D."

Sand the pontoons to a very smooth finish, rounding off the corners at the upper edges only. Then apply three coats of paper cement, letting it dry between each coat. Stick on the silk or tissue reinforcement when you apply the third

(Continued on page 54)



How to Make a Direct Reading Indoor Scale

Here Is a Device That Is Invaluable to Every Indoor Model Builder—A Scale That Requires No Balancing Yet Which Is Easy to Build

By LOUIS GARAMI

SINCE the weight of indoor models is not restricted in any way, the main idea seems to be to make them as light as possible without using hollow "radio beam" spars, skinned microfilm and other heavenly ingredients which are the fondest dream of all who are bitten by the indoor bug. As long as the ship "hangs" together, even if the framework is hardly visible, the real indoor modeller will try to find a way to reduce its weight further and further. But this reducing diet must be pretty scientific in order to keep the model in one piece before and after it takes to the air.

Much of the success depends on the use of a fine scale. The weight of the different parts, according to the size of the model, varies from .001 to .04 of an ounce, so only a scale sensitive enough to weigh to (.001) of an ounce is suitable for this purpose. Our scale is designed to take care of this requirement, but its real object is to speed up the weighing process itself. The bothersome balancing (the only fault of the popular beam scale) is entirely eliminated, saving all the time spent on adjusting the different weights into the proper balance.

Beside this important feature, there are several improvements such as its compactness (only two major parts) and convenience, allowing it to be moved around on the work bench instead of occupying a fixed position on the wall where other types of scales are usually rigged.

The construction is so simple that we were tempted to spell it with a capital S, still the finished product will be surprisingly accurate and convenient.

Construction

Select a hard piece of balsa for the base of the scale, to concentrate most of the weight in this part. As the whole scale weighs only .3 oz., and it stands 9" high, it would topple over easily unless the base is made the heaviest part of it. For all

the rest of the balsa parts use light, straight-grained wood.

Assemble the stationary section first. Line up the center piece, the one with the single edge razor blade glued in its top. It should be at right angles to the base, so your trusty triangle can be used to good advantage. The two little braces will help you to secure this piece in the proper position. Use pins and glue abundantly at this point and while it is drying proceed to cut out the curved balsa used for the scale markings. This



The completed scale ready to weigh your model or parts.

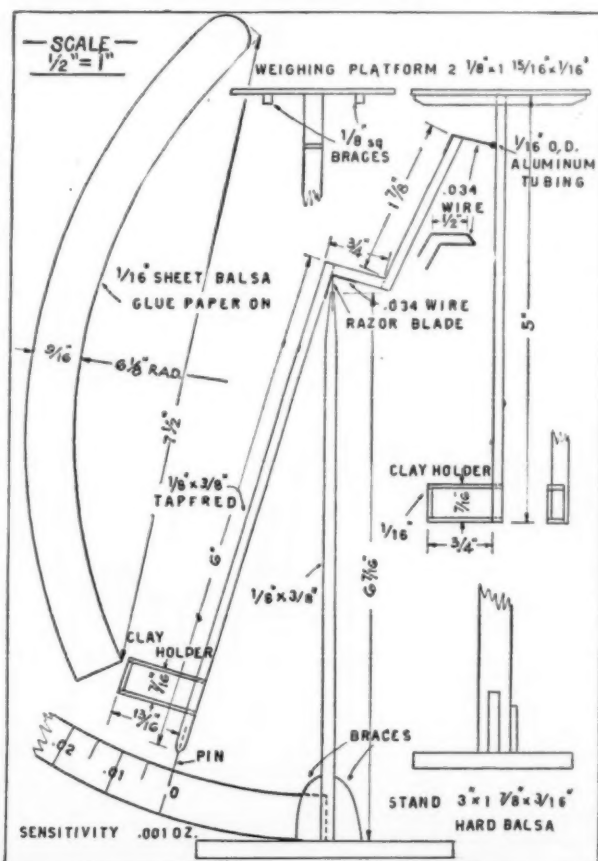
piece should be covered on both sides with white drawing paper, before set and glued into position.

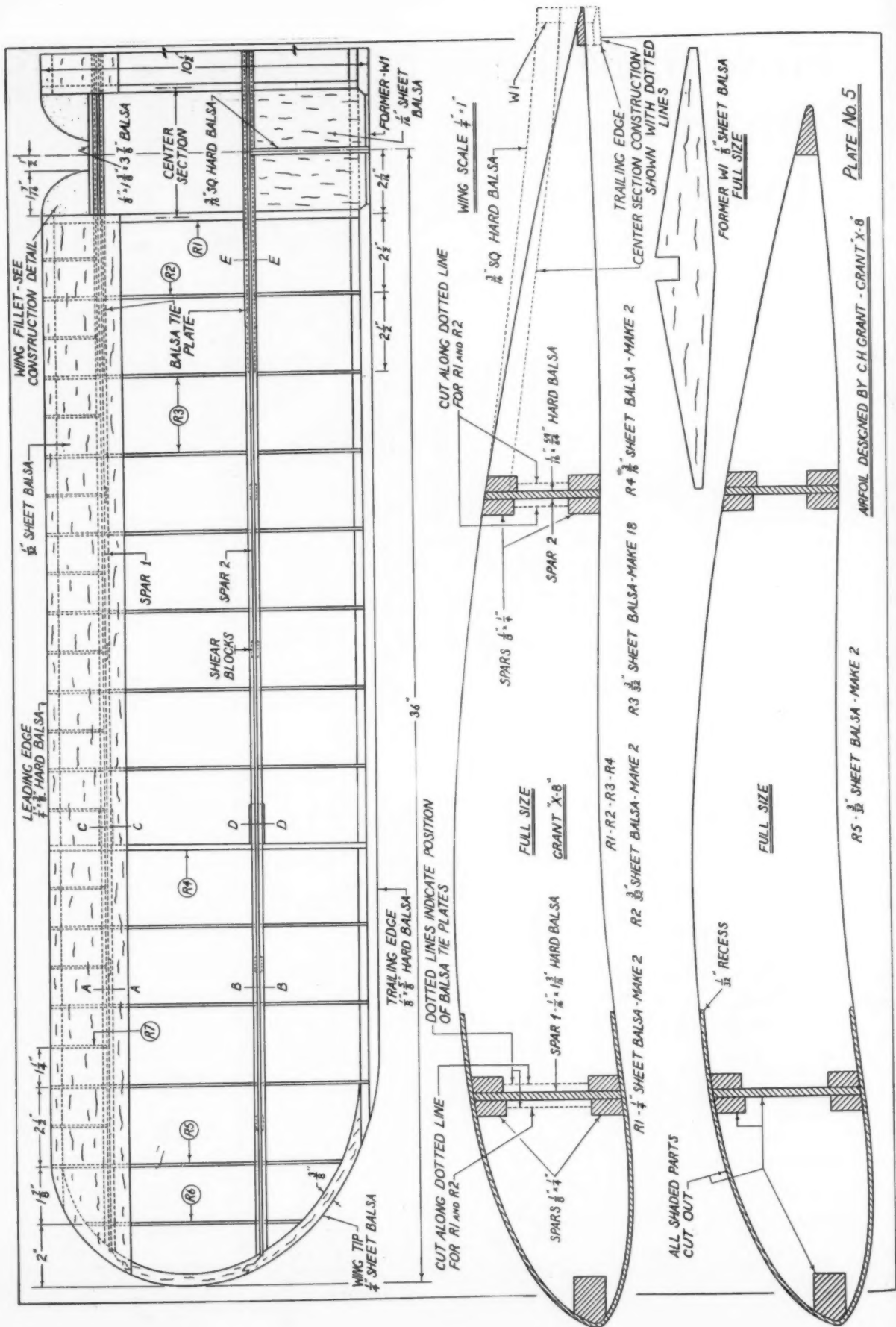
Now the production turns to the moving parts of the scale. The backbone of this part resembling a steam shovel, is three pieces of balsa fitted together. Make sure that their angles are the same as shown on the plan and the joints are perfect. Two pieces of wire bent to fit the crook of the first joint, form a sort of bearing and allow the whole thing to swing freely on top of the razor blade, with the least friction. Now the other wire fitting is bent to shape, not forgetting to slide a short piece of aluminum tubing on it before bending it and cementing to the topmost part of the swinging arm. The weighing platform assembly is glued to the aluminum tubing. When the clayholder at the bottom is filled, it will tend to keep the platform level on account of its superior leverage and gravity. Both clayholders being the same in size and construction can be made together and cemented in their designated places.

Calibration

To calibrate the scale, a one hundredth of an ounce weight is necessary. This can be purchased from model airplane supply houses for ten cents. To begin, both clayholders should be filled full with modeling clay and the swinging arm pin balanced at the same spot as our plan shows. This balance can be obtained by taking little pieces of clay from the heavier side with a knife point or finger nail. Mark the starting line with

(Continued on page 50)





Build and Fly This Miniature "Cub"

How You May Conclude the Construction of Your Gas Model by Building the Wings, Tail Surfaces and Landing Gear

by JESSE DAVIDSON

PART 2

Wherein Two Deer Hunters Find A Lost "Cub"

SHORTLY after the preceding issue of MODEL AIRPLANE NEWS had gone to press relating the strange disappearance of the Cub, word reached us that a couple of deer hunting gentlemen had accidentally stumbled upon it. Almost to the day, two months later, the ship was sighted reposing like a giant exhausted bird in the midst of a small clump of trees fairly obscured by surrounding taller ones. Retrieved from its precarious perch by willing hands, the Cub upon close examination was found to have sustained only superficial damage. Nor had two months of exposure in the mountains of Vermont affected the ship to a harmful degree.

NOTE:

In the first installment on "Build and Fly This Miniature 'Cub'" details were given for a type of rudder and stabilizer adjustment mechanism. This, while serving its purpose at the time it was being test flown has now been discarded in favor of a more suitable and reliable form of adjuster thus giving more positive and accurate action at the slightest turn of the bolts. If the builder has already gone ahead with the old method, it is suggested that he remove it

and install the newer one described as follows:

Rudder

The rudder fitting mount, A, shown in full size on Plate 4-A is cut to shape from 3/16" bass. The metal fitting itself is cut to the design shown from 1/32" sheet aluminum, drilled and bent and then fastened with screws to the wood mount,

A and B (two of each) to the dimensions given. They are then cemented securely into position above and below the last diagonal member of the fuselage frame. Next, the fittings are shaped from 1/32" sheet brass and holes drilled accordingly. Bend the fittings along the lines indicated and attach to the mounting blocks by using 1/16" dia. wood screws.

Stabilizer Construction

Full size stabilizer ribs to be cut and streamlined were shown on Plate No. 3 published in the preceding issue. All ribs cut from 3/32" sheet balsa are notched to accommodate a single bass spar 5/16" sq. The outline framework is shaped and streamlined from 5/16" sheet. In making the various units of the dovetailed parts, care should be exercised to obtain the correct curve throughout.

Note the position of balsa block S-9 and cement this piece in securely. Note also, the position of stabilizer fitting blocks C. Each of these are made up of two pieces of balsa, in which after a No. 4-36 nut is imbedded between them, are cemented cross-grained. See Plate 4-A.

Provisions are then made for 1/8" diameter holes in each block to accommodate adjustment bolts. The next step is to cement the fitting blocks into position

(Continued on page 36)



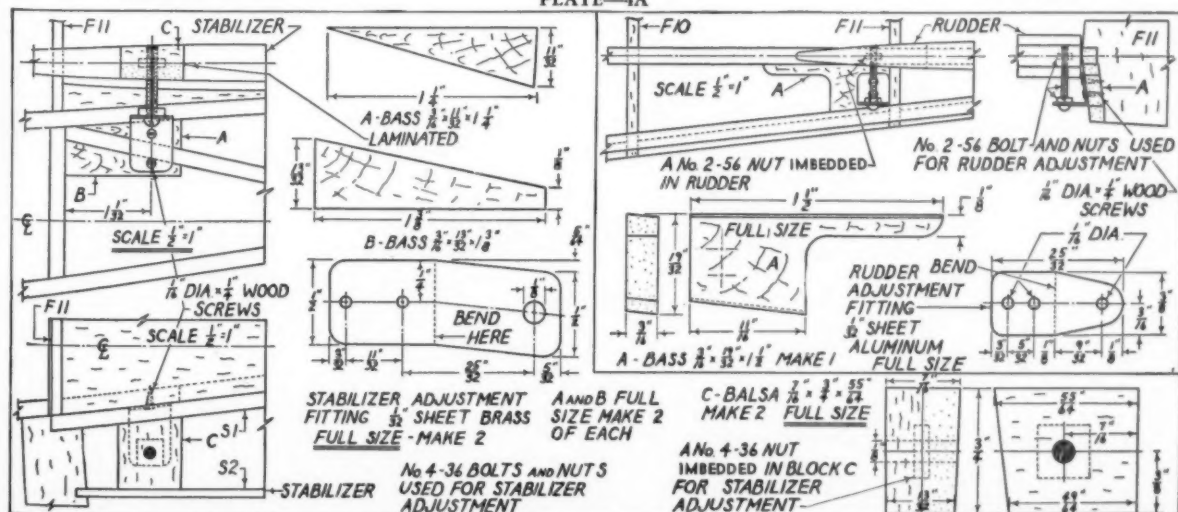
The "Cub" takes the air at a steep angle of climb after a short run. In two minutes it was 1500 ft. above us.

which, in turn is cemented into position as shown in the top and front views of the rudder adjustment detail. Simple? That's all there is to it.

Stabilizer Fitting Mounts

The stabilizer detail fittings and mount blocks are shown clearly on Plate 4-A. The first step is to shape angular blocks

PLATE-4A

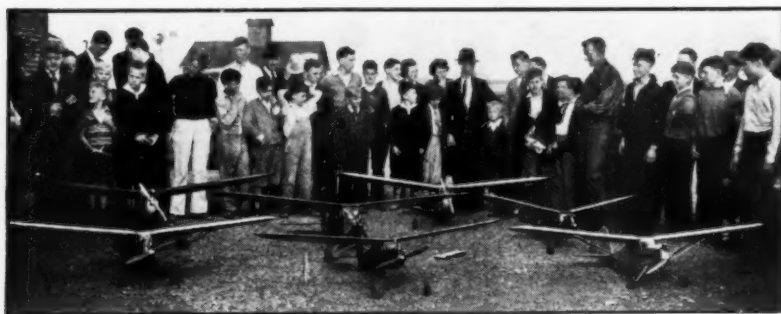




National Aeronautic Association Junior Membership News



Prepared by National Aeronautic Association, Dupont Circle, Washington, D. C.



Contestants and some of their planes that took part in the first contest held by the Junior Chapter of the Bloomington Normal School, Bloomington, Ill.

Youth Education

The first National Planning Conference and Convention of the National Aeronautic Association was held in Cleveland, Ohio, from January 9th to January 12th.

This conference was especially important in the lives of all model builders, inasmuch as plans for a nation-wide youth movement were presented to delegates in careful detail.

The whole idea of the youth movement is a broad educational program in aviation. It has been planned to set up agencies under N.A.A. governors in each state. These governors will supervise and promote activities in the schools, organizations throughout the state which are already established and new clubs which may be formed.

In brief the program is covered by the recommendations which were put before the conference for a vote. It is as follows: There should be an integrated program, step-by-step for youth aviation education and training carried out on a nation-wide scale under the direction of the N.A.A. This program should have the active support of the aviation industry and the government.

Gas model building should be encouraged and the N.A.A. program for supervision of this activity supported by State and Federal officials.

It should be the policy of the Federal agencies concerned to provide soaring sites in or adjacent to recreation areas under Federal control. A glider expert should be employed by the Bureau of Air Commerce to supervise all matters pertaining to motorless heavier-than-air aviation.

Graduates of recognized college flying clubs otherwise qualified should be given some type of preferential rating in the

selection of candidates for Army and Navy flight training. Such clubs should be eligible to participate in any governmental assistance offered light plane groups.

There should be federal legislation establishing an aviation division in the office of education which would offer aid material for the setting up and conduct of suitable courses for the secondary schools, vocational schools and colleges, and would otherwise act to encourage school-time aeronautic education.

This recommendation was passed by an overwhelming majority of the delegates from all over the United States.

Roy E. Stoner Sets Two New National Records

A little ice doesn't stop a record-breaker like Roy E. Stoner of Rockford, Illinois. However, we'll let Roy tell the story in his own words:

"The main feature of my Class 'd' fuselage R.O.W. model is the one bladed propeller. This propeller added greatly to the height but the motor run is a few seconds shorter. The fuselage is also an-

other feature added in this design, the square front and triangle in the rear brings a good deal of the weight in the front, and lessens the weight on the tail.

"The day I flew the model we had to crack the ice of the pond to have a place to R.O.W. the model. The motor that I had in the plane was one I had been using all summer and it was pretty well shot. I gave the model about 350 turns and launched it. It turned in a flight of 52 seconds. On the next flight, I gave it about 500 turns and launched it again. It turned in the record flight of 1 minute 13 seconds. I changed the floats over to my Class 'C' model, which is the same one with which I had won the Stout Trophy. This model flew very much like my Class 'D.' The record flight time was 1 minute and 12 seconds, one second less than my Class 'D.'"

Two records in one day certainly sets a "high" which will take a long time to meet. Congratulations to you, Roy Stoner, and keep up the swell work!

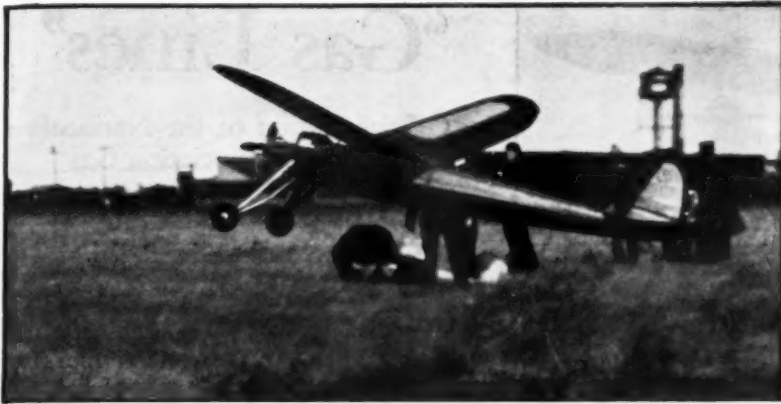
Chapter News From Here and There

Richard Blankney reports that the Bloomington Normal Chapter of Bloomington, Illinois, are laying plans for a really big Gas Model Meet in the early spring. Also, they are going to try to send a few of the members to the National Meet in 1938.

The Rockford, Illinois, Chapter, of which the record-breaker, Roy Stoner, is a member, is functioning 100%. They recently affiliated with the local Boys Club and now have a Senior and Junior organization. Each Sunday they hold local try-outs in their new armory and besides that have regular meetings twice a week. Of great interest to all model builders in that



Henry Zalucha and his Buccaneer gas job at the contest held by the Junior Chapter of the Bloomington Normal School.



Here is a "real" action shot, a gas model in the act of gliding in to a three point landing at a recent contest on Long Island.

section was the United Air Lines movie "Flying Coast to Coast on the Mainliner." Beloit and Janesville model builders were guests of Rockford on that occasion. About three hundred attended.

The Detroit, Michigan, Chapter is certainly not allowing the winter weather to dampen their enthusiasm. Arthur J. Vhay recently sent in their future program and it almost makes us wish that we could join in it. Just recently they had Commissioner C. E. Brewer of the Detroit Department of Recreation as speaker. This meeting was followed by a ping-pong tournament which is a permanent part of their winter activity. Their meetings are open forums for discussion. They are given a definite subject, such as adaptable airfoils for gas jobs, prop efficiency, etc., and debate upon it. The membership act as judges.

Their plans for the future will include a Model Aircraft Day to be held at the Police Headquarters Armory where gas jobs will be exhibited and explained to the public. All persons interested in model aviation are invited to bring rubber models to be flown and exhibited. Watch for the date!

Two new members have been added to the Wausau, Wisconsin, Chapter, and a request was received at headquarters for more application blanks. This, as most of you know, is a new Chapter, but they aren't quitting just because they have their Charter. F. E. Bachhuber, Jr., their Senior Advisor has just recently made application to Headquarters for appointment as Contest Director. Keep up the good work, Wausau.

The Buzzard Junior Chapter of the N.A.A. in Tyler, Texas, just recently added a new member in the person of Maurice Shahady.

The Junior Chapter members in Topeka, Kansas, were guests of the Junior Chamber of Commerce at a dinner given by that organization and the Kiwanis Club of that city. George Lusk of Transcontinental Western Airlines was on hand to talk about plane transportation and to cover details not in the picture "Coast to Coast by Mainliner" which was the big feature of the evening. Dr. Hugh D. Wilson, N.A.A. Contest Director, was program chairman for this event.

Roy Marquardt, a member of the Research Committee appointed by the Academy of Model Aeronautics last spring, is at present teaching a high school class in Aviation. Roy tells us that they have done a great deal of experimenting in the past but it has been chiefly directed along the lines of large ship effects. At present he has in mind a slow speed tunnel to be used at indoor speeds during the first semester and at outdoor speeds during the second. He also hopes to be able to check on the dihedral-lateral area couple on enough models to be able to formulate some better rules there. If time permits, they plan to do something in the propeller field.

A Charter was just recently granted to the Northeast Model Airplane Club. This makes three active groups in Philadelphia, all working well and under the direction of William Berry and Jesse Bieberman, are a well organized and flourishing addition to the N.A.A.

A. Gordon Wheler, Secretary of the Syracuse Model Airplane Club, writes us that eight new members have been added to the Syracuse Chapter. They are Edwin Apps, Jack Collins, William Huber, George Kesel, Henry Mosher, Arthur Schroeder, Hugh Thompson, and Donald Wilcox. It is a pleasure to welcome them

into the N.A.A.

The Teche Chapter in New Iberia, Louisiana, has just added to its membership rolls the name of Lucille Ruffello, who is the first girl Junior member in the state.

Model aeronautics, under the guidance of Joseph and Rocco Gloriosio, is slowly but surely taking the entire state of Louisiana. It is their aim to have model aeronautics as part of public school education. Certainly this is a fine objective and we hope that they will receive the assistance of all N.A.A.'ers in Louisiana. They are also planning to form a State Board, such as that in Kansas, to coordinate all model activity and to promote state-wide meets.

And speaking of state-wide meets, Joseph Gloriosio has moving pictures of the last meet of this kind held in Lafayette, La. He is showing these movies in all parts of the state. This has, of course, increased the interest in model aeronautics in all sections.

Kenneth B. Stephens, President of the Ludington, Michigan, Chapter has advised us that they have completed plans for a Model Chapter in that city. P. C. Hartman will be appointed chairman of Junior activities and is expected to send in application for charter shortly. If charter is granted, they plan to hold a model exhibition and indoor meet the last of January with the Senior group offering prizes. With the excellent backing of the Senior Chapter, we look forward to this new model Chapter.

Robert Babcock, Senior N.A.A. Chapter official in Kalamazoo, Michigan, writes that plans are progressing nicely for a Junior Chapter in that city. Two more prospective chapters are taking shape in Richmond Heights, Missouri, and Providence, Rhode Island. The Janesville Model Club may combine with the Beloit, Wisconsin, Chapter to form a larger group.

Lieutenant Everett C. Plummer recently paid a visit to N.A.A. headquarters to report on model work in New Jersey. The

(Continued on page 50)

Fill in the coupon below for membership in the N.A.A.

Use this coupon for either junior membership application *or* for requesting NAA Junior Chapter information.

NATIONAL AERONAUTIC ASSOCIATION OF U.S.A.

Dupont Circle, Washington, D.C.

☐ Please send me information on how to form an NAA Junior Chapter and a Chapter charter application form. I enclose a 3c stamp for return postage.

☐ I enclose fifty cents for annual NAA Junior membership dues (use cash, check or money order) and hereby make application for Junior membership in the National Aeronautic Association. (Age limit 21 years).

Name
(Please print or type)

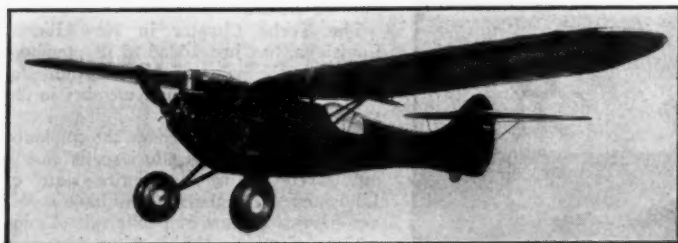
Street

City State

Date of Birth.....
(Month, Day, Year)

Membership application approved*.....

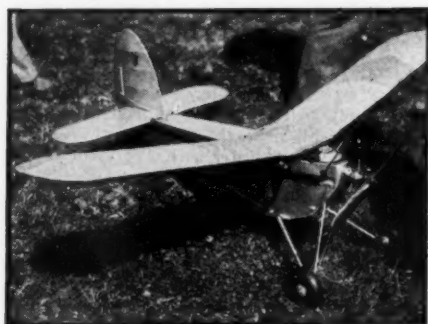
*(If membership application is being made and applicant is under eighteen, have parent sign here.)



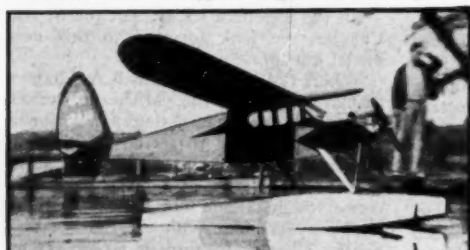
Pict. No. 1. A beautiful gull-wing ship by Dallas Sherman.

UNDOUBTEDLY most International Gas Model Airplane Association members have received their National Aeronautic Association Gas Model Division membership and license application blanks. They should not delay in making their transfer

Send News and Pictures of Your Activities to "Gas Lines" for Publication



Pict. No. 2. A typical English model.



Pict. No. 3. A hydro by Paul Broccard that has made many perfect flights with no crashes.



Pict. No. 4. Bill Slaughter's fine flying cabin job.



Pict. No. 6. Believe it or not, this was taken at a contest in Massachusetts!!!

"Gas Lines"

Official Section of the National
Aeronautic Association Gas
Model Division

Formerly the I.G.M.A.A.



Emblem of the
"Pioneers" of
the N.A.A. Gas
Model Division

of membership from the I.G.M.A.A. to the N.A.A. Those who have not received blanks should write immediately to the National Aeronautic Association, Dupont Circle, Washington, D.C., for them, together with the bulletin which outlines the new nationwide program for model aeronautics.

This program will be carried on in a manner such as model aeronautics has never seen before. We believe a big "boom" is due for model airplane builders. For details read the bulletin, N.A.A. news as it appears in this magazine and "Gas Lines" in future issues.

All unit leaders should take immediate steps to contact every member under their guidance and see that each makes his transfer to the N.A.A. Units should be transferred to the N.A.A. as a unit, if possible. No change in its organization is required. Units of the I.G.M.A.A. in the future will be known as units of the gas model division of the N.A.A. They may retain their number and identity. We hope that unit leaders will take this responsibility upon themselves immediately for the sake of every member in the unit.

We have news that on the strength of the N.A.A. program and supervision of gas model flying that the gas model ban has been lifted in Connecticut

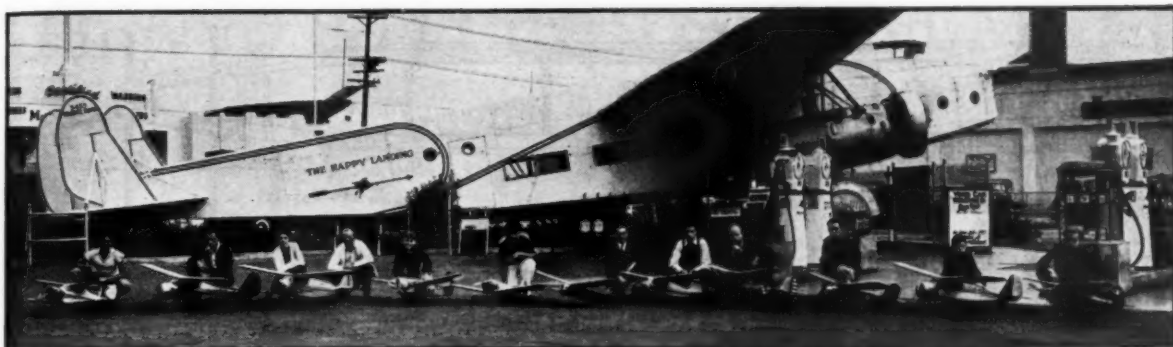
and soon will be in Massachusetts, if this latter has not already taken place by the time you read this. We look forward to the cooperation of every former I.G.M.A.A. member to help make gas model flying a success under this new program. Probably there may be some suggestions regarding details embodied in parts of it. If you have suggestions of any kind write immediately to "Gas Lines, c/o MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City. Mr. Charles Grant, the chairman of the Governing Board of the Gas Model Division of the Academy of Model Aeronautics will take every step possible to meet such suggestions. Undoubtedly circumstances may require modification of rules. Such matters will be dealt with with the welfare and happiness of all members being kept foremost in the minds of those who have been chosen leaders of this new movement. We wish all gas model builders to know that rules will not be made in an arbitrary fashion. Everyone will have a chance to voice his opinion on all matters pertaining to this activity. These opinions will guide its leaders.

There may be some question concerning the fee required for membership. The regular fee is \$1 per year. Those who are members of the N.A.A. and have paid the fee of 50c for the current year's membership will be required to pay only 50c more to make the total of \$1 for the Gas Model Division membership. Those who have paid a fee of 25c for N.A.A. membership will be required to pay 75c additional for this new membership in the Gas Model Division.

Send immediately the required fee to-



Pict. No. 5. A sad story without words.



Pict. No. 7. This fine old Fokker transport makes a good background for the midget plane flyers in Los Angeles.

gether with your I.G.M.A.A. membership card and the membership and pledge application blank, properly filled in to Gas Model Division, National Aeronautic Association, Dupont Circle, Washington, D.C.

One of the first units to be transferred to the new N.A.A. Gas Model Division is combined in units No. 4 and No. 7, the Metropolitan Model League, of which Mr. Irwin Polk, 421 Seventh Avenue, New York City, is the leader. A special meeting was held on January 14th, at 8 P.M., at which arrangements were made for the transfer. These units have announced the sponsorship of the Official Eastern States Gas Model Plane Championship Contest. The meet will be held on Sunday, April 24th, at the close of the Easter school vacation week.

Mr. Polk comments as follows concerning the affiliation of the I.G.M.A.A. with the N.A.A.:

"The I.G.M.A.A. in becoming affiliated with the N.A.A. joins three other 'expert' organizations in the youth field; the Academy of Model Aeronautics, the Soaring Society of America and the National Intercollegiate Flying Club, in laying a technical base for integrated activity in the youth field. Thus, by interlocking membership agreements five aeronautical organizations have allied themselves under a common banner for joint effort.

"With the nation's experts in the present art of model building, gliding and soaring and club flying joined together under the banner of the N.A.A., furnishing the necessary technical direction, and with increased civic, education, government and industry support, many opportunities are presented for greater accomplishment in the youth air education and training field.

"Nothing could have helped the standing



Pict. No. 13. Robert E. Lee and his Cavalier which won first place for him in a Saint Paul, Minn., contest.

of gas model builders and fliers as this merger which comes at a most opportune time.

"Proper regulation is now possible. Detailed plans have been worked out to properly supervise the activity. Each builder will be required to sign a pledge to abide by simple common sense rules in regard to flying of gas models. With the cooperation of every builder and flier of gas models and with the weeding out by license revocation of those who break the laws, the cooperation and assistance of aeronautic industry and civic groups can be secured to obtain proper flying sites and backing for the further promotion of the sport."

One of the things of the greatest interest to N.A.A. Gas Model Division members is the new proposed formula which will restrict the performance of gas models to within certain limits. It is felt that these restrictions are necessary in order to prevent gas models from becoming "floaters" and soaring to parts unknown. In this way the loss of ships is not only prevented but the safety element is increased. The purpose is to restrict flights to airports or other sites at which models operate. The

(Continued on page 60)



Pict. No. 12. Robert Fukuda winds up his KG before a flight; one of 75 planes in Hawaii.



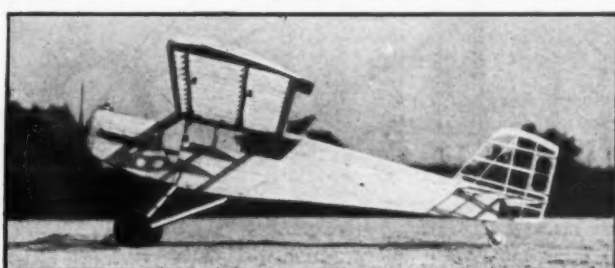
Pict. No. 10. This KG was born in New Zealand. J. I. Mehrtens is its proud father. It will be powered with a Forster Bros. engine.



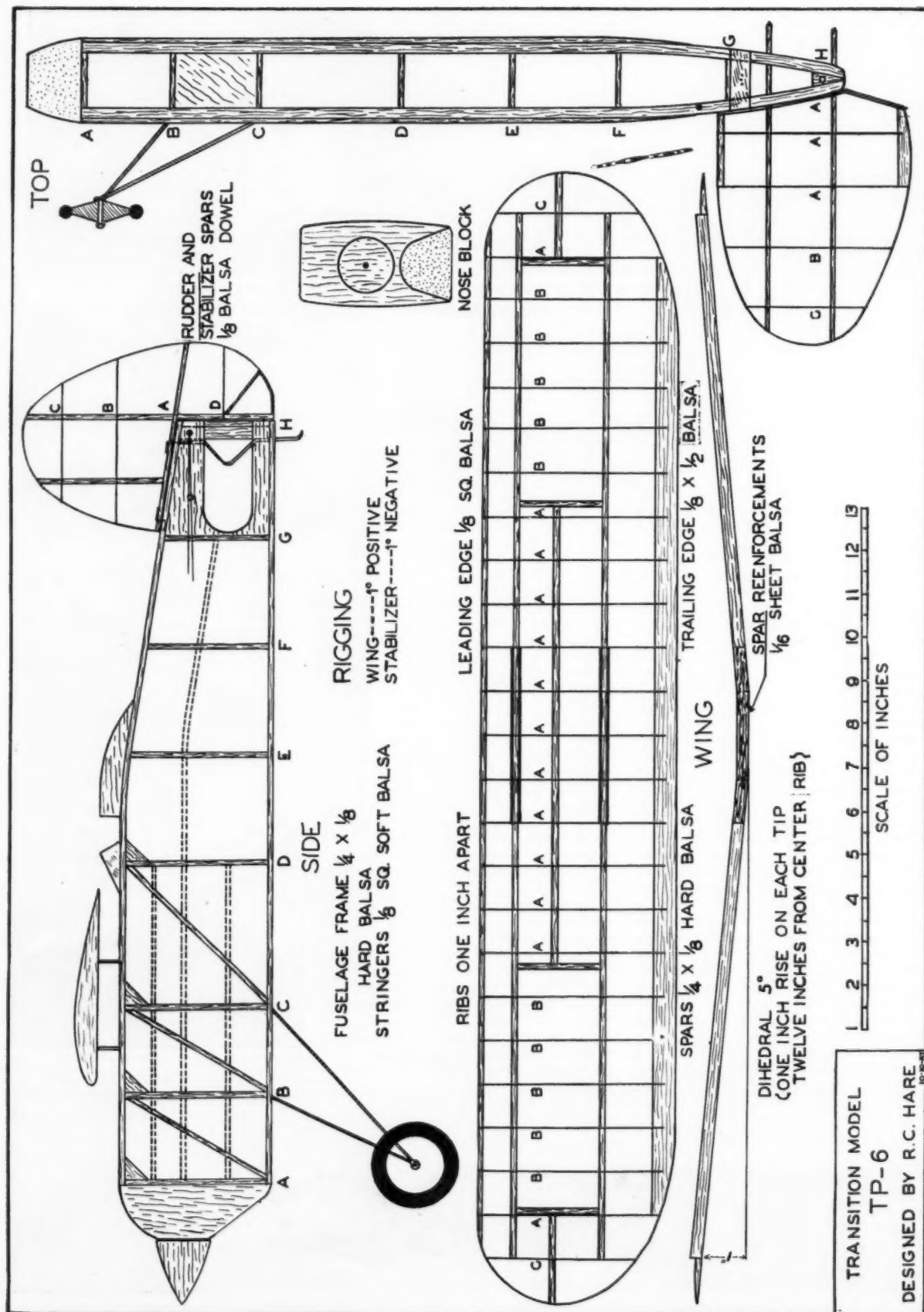
Pict. No. 11. K. Gerravette of the Noroton Heights Gas Model Club and his "Quaker."



Pict. No. 9. In South Africa, V. Gracie's model takes the air.



Pict. No. 8. John McMillan's Curtiss Robin scale model.



How to Build the Transition Model

A "Stepping Stone" to Gas Models That Will Instruct Rubber Model Builders in the Essentials of Gas Model Construction

By ROBERT C. HARE

A GROUP of novice model builders coached by the author recently decided to "go gas" according to the current trend, after a short experience with rubber-powered models.

These boys, who average fourteen years of age, were like any other beginners. Kits had played a big role in their experience, but kits, they found, did not give sufficient practice to allow them to construct a gas job which would be accurate enough in construction and rigging to make safe the installation of a precious engine.

The model described here was designed by the writer for the sole purpose of supplying such novices with essentials of gas model construction and design without incurring the cost of a large model, and risk of a smashed engine.

Construction of the TP-6 follows closely that of gas models. It requires work with larger sizes of wood than is used in conventional rubber types, gives practice in metal cutting, soldering, shaping heavy wire parts, balancing, and most of all, accuracy of alignment.

In constructing the TP-6 transition-pursuit model, bear in mind that before you have covered it, you will have made 149 separate pieces which must be accurately cut and fitted. Begin by studying the drawings and text carefully. Become familiar with every aspect of construction and design, and study until you understand why each part is so placed or designed. All materials are medium hard balsa unless otherwise specified either in text or drawings.

Use the accompanying jig table to lay out your full size fuselage drawing. This table gives vertical readings taken from the bottom longeron at stations A through H. The bottom longerons are absolutely flat. This was designed so that the imaginary line of thrust, a bugaboo to many builders, could be dispensed with and readings taken from a tangible source.

When your outline is completed, cover the drawing with waxed paper and build a conventional jig. Make one body side at a time, each identical and in perfect alignment. It is best to steam the top longeron before fitting it into the jig as it will then dry to shape and offset any possibility of pulling the



It looks like a gas job but is actually the finished transition model ready for a flight. Note the racy, sturdy appearance.

lower longeron out of line. The stock is $\frac{1}{4} \times \frac{1}{8}$ inch balsa.

Be sure to put in the gussets located at the top junctures of uprights A, B, C and D. These small pieces will greatly increase the bracing effect of the adjacent diagonals. Use $\frac{1}{8}$ " sheet balsa for gussets. When both sides are complete check each for alignment and make any corrections at this point.

Now lay each side on its lower longeron spaced far enough apart to fit in the top and bottom cross pieces. Each of these members is $1\frac{1}{4}$ " long. You will need 12 of them, two for each station A through F. While assembling the sides check frequently for vertical alignment by using a 90 degree drafting angle.

When top and bottom cross-pieces have dried, steam the longerons at station F and bring the two sides together in a vertical knife edge, to be called station H. A strong rubber band tied around the upper and lower longeron pairs at this point will keep them in place. Use sufficient cement to insure a strong, rugged joint. Round off the

ends of the joints as shown in the top view fuselage drawing.

This completed, you will have the primary fuselage skeleton, perfection of which depends a greater part of the strength and performance of any model.

Returning to the stern, make two wedges of $\frac{1}{8}$ " sheet balsa, hard variety, to slip into the apices of the top and bottom longerons where they join at H. These wedges should be at least one inch long. Next make a "T" sectioned stern post from two pieces of $\frac{1}{4} \times \frac{1}{8}$ " hard balsa and cement it in place as shown in the drawings at station H.

Be certain that this post is absolutely vertical.

The next step is to put on the sheet balsa fuselage top, not shown in the drawing in order to achieve clarity. This sheet is $1/16$ " thick. Sand it smooth on both sides. Coat the top of the longerons and cross-pieces generously with cement and smooth on the sheet. If necessary, light rubber bands will keep the sheet in contact with the longerons should it tend to spring up towards the rear. When the cement has dried, trim the sheet to the top outline and sand again.

At this point it is a good idea to check the alignment once again. If the lower longerons have turned up in the rear, steam them and weight the structure on a flat surface. Let the fuselage set in this position for at least four hours, overnight if possible. This may delay construction but will be time well spent.

So far, construction of the TP-6 has been similar to a conventional model except, perhaps, for the use of heavier stock, greater emphasis on accuracy and what might seem to be unnecessary detail.

Construction of metal parts, however, will give a good sample of the finer details of model building. All gas models carry a certain amount of metal work which will be pretty sloppy if the builder hasn't worked with metals before. A good job on the TP-6 fittings will be valuable schooling for later on.

First let's make the thrust bearing. You will need a piece of $\frac{1}{8}$ " O.D. brass tubing $1\frac{1}{2}$ " long. The thrust bearing takes the strain transmitted to the shaft by the motor. This strain must be borne evenly to keep the propeller revolving in a plane



The model "snapped" at the moment of a fast take off. For practice in gas model operation it is unexcelled.

when viewed from the side. Therefore select a piece of tubing that is perfectly straight.

From a piece of 1/32" sheet brass cut a circular bearing plate to size as shown in the drawings and drill a 1/8" hole in its exact center.

It is best to have a tight fit here, and if the first bearing plate is loose, make a new one but drill a smaller hole, reaming it to fit the tube.

Set the bearing plate at a point 1/16" from one end of the tube so that the plate forms a 90 degree angle to the tube all around.

Now put the bearing assembly in a vise, plate up and flow solder around the joint.

Soldering paste will be a big help in obtaining a clean, solid job. Best way to be sure of a good job is to heat the bearing with the iron until the soldering paste boils, then touch the solder to the iron a half inch from its point and let the molten metal flow to the joint, working around the tube neck as you go.

File away all excess solder when the bearing has cooled and finish to the shape shown in the drawings.

Last detail is to lap in the bearing end of the tube. File this end as smooth as possible, then work it to a true bearing surface with a whetstone. This will take only a few minutes but will provide a smooth, easy running bearing with a minimum of friction.

While the tubing is handy, cut a piece long enough for the skid-rear hook fitting and bend it to the shape shown. The skid end should first be hammered flat, then bent and filed.

Returning to the nose, straighten a 12" piece of No. 24 music wire and bend the front landing gear legs as shown in the drawings. Make the tread 6 inches. The front leg ends are bent to form the axles. Rear legs will take a 13 inch length of the same wire. Leg ends in this case are bent around the axle stubs.

When each pair of legs is completed, bind the front legs to station B, the rear pair to station C. Use plenty of thread wound evenly and coat the winding well with cement. Slip the axles through the rear leg loops and solder the joints carefully.

To install the tail skid-rear hook tube, drill 1/8" holes in each of the balsa wedges as near to the stern post as possible. The straight parts of the tube, in other words, should rest against the "T" shaft.

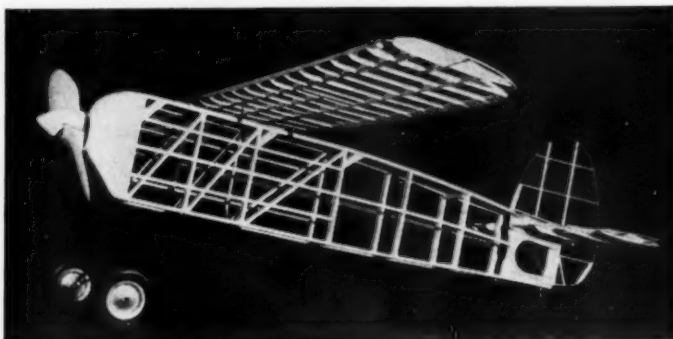
Set the tube in place, cement it well and bind it securely with thread. A note here about binding will come in handy in later experience. Many model builders consider a binding job well done when thread is wound promiscuously around the objects being secured. In most cases this type of binding will be heavy and untidy, but most important of all will center the load of such parts on one tiny section of the members.

Do your binding neatly, wrapping the

threads closely together, working along until the entire surface to be joined is covered. This method is actually lighter than promiscuous binding, and at the same time is many times stronger because it distributes the load evenly.

Have the top of the tube flush with the balsa sheet in the rear. This flushness is necessary for proper rudder fit.

Select a piece of balsa 3 1/2" high, 2" wide and 1 1/4" deep for the nose block. The grain must run the long way. Referring to the drawings find the thrust center and draw a circle 1 1/4" in diameter using the thrust center as a compass point. Carve the block away from this circle, endeavoring to obtain the shape shown in the plans.



Here you can see clearly the details of the frame structure. Note the diagonals at the points of great stress.

Station	Height of each Upright	Upright distance from Station "A"	Distance of station to station
A	3 1/2"	0"	0"
B	3 1/2"	2"	2"
C	3 1/2"	4"	2"
D	3 1/2"	7 1/4"	3 1/4"
E	3 3/8"	9 3/4"	2 1/2"
F	3"	12 1/4"	2 1/2"
G	2 5/8"	14 3/4"	2 1/2"
H	2 1/4"	17 1/2"	2 3/4"
Total Length		17 1/2"	

JIG TABLE

Notice that the block sides swell out 1/8" on each side in the center making the top and bottom 1 3/4" wide, the center 2".

The flat portion below the center indicates a radiator. Although the actual shape may be altered to suit the builder, the shape shown here is the best for looks and strength.

Drill a bearing hole directly in the center of the circle. Be positive that it is on a 90 degree angle with the block's back. Sight down the hole, holding the block in place on the fuselage. You should be able to see the upper bend of the skid.

When the hole is lined up, slip in the bearing tube the plate covering the circle, and cement it well. The nose block may seem rather heavy, but do not attempt to lighten it.

Cement the nose block to station A, line it up perfectly and set it aside for a few minutes. Working from the back, spread cement generously over the uprights and cross-pieces of station A where they contact the block.

By now, you will notice, the TP-6 has taken on a decidedly scrappy appearance.

Three stringers of 1/8" square balsa are put on next. Cement these to each upright and diagonal crossed. Top and bottom stringers run from station A to D. Middle

stringer runs from station A to E in a straight line, then curves down to station G where it is cemented equidistant from upper and lower long-erons. Sand the outside corners of the stringers to a semicircular section.

Next make two cutout sheet sides to fit between stations G and H. These plates are made from 1/16" balsa sheet. Their purpose is twofold. First they allow an anchorage for the stabilizer spars, second they dress up the model. Cement these plates well and curve

their trailing edges to conform with the curved longeron ends at station H.

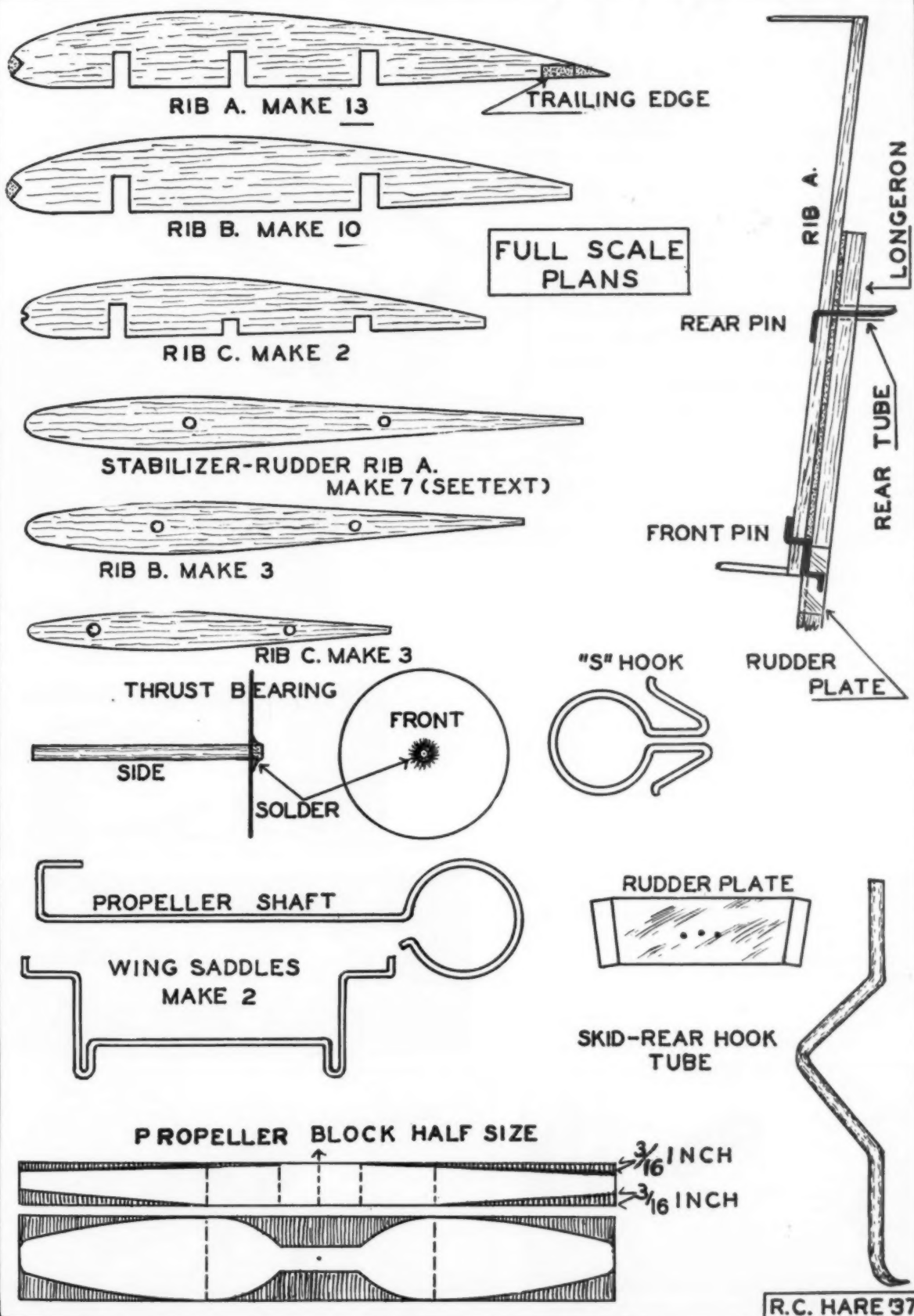
At this point it is well to put on the wheels. Each wheel must weight at least 3/4 of an ounce but preferably 1 oz. each. Diameter should be in the neighborhood of, but not less than, 2 inches. The weight is necessary to obtain properly flying qualities for a model of this design.

If wheels cannot be found to meet the above specifications, they may be made in this manner. Go to your local department store's notion or button department and purchase some 1 1/2" button moulds. Then at the drapery-curtain department buy an equal number of wooden curtain rings with an inside diameter of 1 1/2". Set the button mould inside the curtain ring (they will fit tightly) and you have a perfectly good wheel 2 3/8" in diameter! The weight of each will be about 5/8 oz. as they are. A 3/4" iron washer cemented to the inside will imitate a brake drum and bring the weight up to its proper amount. Make a bushing for each wheel from 1/8" O.D. brass tubing.

Slip the wheels on the axles, solder on a small brass hub 3/16" in diameter. A drop of oil on each axle will provide a free running wheel.

The finishing touch on the fuselage is very important and should not be overlooked. Cut a piece of 1/8" sheet balsa of the hard variety to fit between stations B and C where the landing gear is bound. Its purpose is to make the landing gear section crashproof. Be sure the fit is tight, make several sheets if necessary until the right one is found. Cement this sheet generously.

The fuselage frame now complete, turn to the wing drawings and study the construction. (Continued on page 38)



R.C. HARE '37

AIR WAYS

HERE AND THERE

What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World. Tell Others What You Are Doing

Air Ways Club News

Send in Your Model Plane Pictures and News of Your Activities for Publication in Air Ways. Help to Bring the News of Your Experiments to Your Fellow Club Members

JUDGING from our correspondence it appears that model fans are putting aside "rubber" for "gas." News of rubber model activity is growing less while volumes are being received from experimenters with gas models. We are not deserting our rubber-powered model builders nevertheless, as this part of the game is very essential for learning the fundamental principles which govern flying.

In this issue we are making a special appeal to rubber-powered builders in the nature of two very interesting articles. One describes a rubber-powered model which may be built by a novice yet which gives remarkable performance. The other is a so-called Transition model which will teach the rubber-powered fan many points about gas model construction. These are two very interesting and fine flying little ships and we hope that sometime in the near future we will be receiving some interesting photographs of them taken by Air Ways Club members who have built them. We would like to know how you like them and if you have obtained interesting results.

Our artists have been busy this month. Norman C. Barker of 3 Pine Street, Malden, Massachusetts, appears to be the most active one. He sends us a drawing of the Gloster Day and Night Fighter, which appears at the head of the article. This ship is said to have a speed of 260 miles per hour. We cannot help but wonder where the speed comes from, inasmuch as it is exactly like other ships in

its design which make only in the neighborhood of 200 to 220 miles per hour.

Picture No. 1 shows an interesting scale model of Benny Howard's "Mr." Mulligan, built by Dan Kerr of 36 Woodworth Avenue, Jamestown, New York. The careful detail of the construction shows the work of a real craftsman. The cowl especially is most realistic. We are indebted for this picture to Robert M. Woodin of Buffalo, New York, who is a friend of Dan's. We are sorry we cannot give you more information concerning this ship, but Mr. Woodin has been very brief in explaining its characteristics.

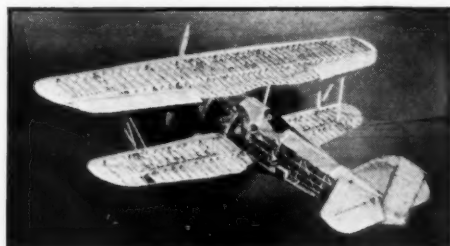
A very interesting model of a Curtiss Hawk, built in extreme detail, is shown in picture No. 2. This

Pict. No. 1. (Upper right) A beautiful scale "Mr." Mulligan by Dan Kerr.

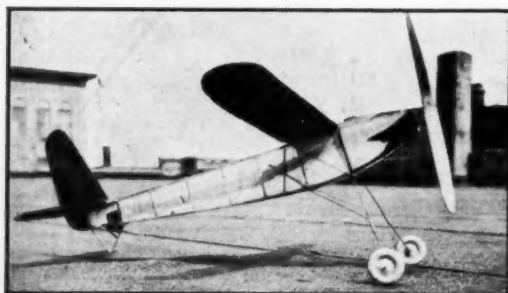
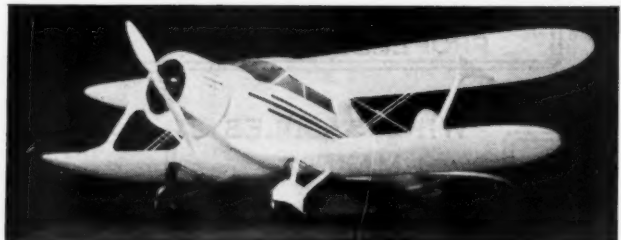
Pict. No. 3. (Right) A perfectly finished Beechcraft model by Lewis Shore.



Gloster Day and Night Fighter, by Barker.



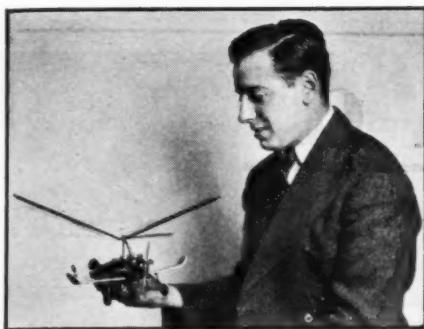
Pict. No. 2. What a model! A Curtiss Hawk built in complete detail, with movable controls by Louis Heinzerling.



Pict. No. 5. A 27 m.p.h. duration plane by H. Dikel.



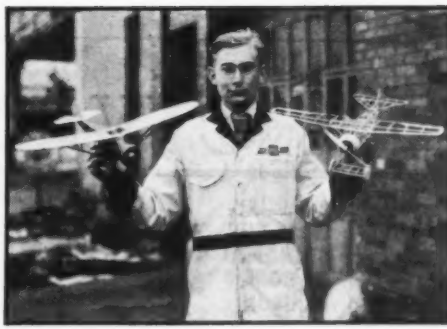
Pict. No. 4. A solid scale Boeing Fighter by J. Bloom.



Pict. No. 6. Sydney Wallerstein of the J.A.L. with his scale autogiro model. He rates as an Ace in his club.



Pict. No. 7. Bill Downey and his 31 inch, 56 m.p.h. scale speed job.



Pict. No. 8. Vincent Anderson holding two of his beautifully built flying scales planes which were on exhibition.



Pict. No. 10. A six inch model of a Vultee V-1A and the trophy it won for Vito Garofalo.



Pict. No. 9. A fine flight picture of Arlo Koontz's Jimmie Allen Sky Raider in full flight.

and contains about 2000 pieces. The detail is complete, including movable controls from the cockpit by the standard control stick and rudder power. The motor is cast from lead and is built from a blueprint of the original. The wheels and tail skid are mounted on shock absorbers. The covering is of silk and metal exactly as in the large ship. You will note that the upper covering of the wing has been removed so you may see the internal structure.

Lewis Shore of 704 South Estelle, Wichita, Kansas, sends us picture No. 3, which shows his solid scale Beechcraft C-17 series. The most remarkable feature of this model is its beautiful finish. Though a solid model the fuselage has been hollowed out. It was made in two halves before the hollowing process was undertaken. When each half was completed they were cemented together. The cabin section is lined with the same upholstery material as used at the factory. The ship has a wing span of nineteen inches and was made from regular three view drawings to 1/20" scale. This job would look well on anyone's mantelpiece provided there is enough room.

We have another solid scale model, built by J. Bloom of 8 Hartwell Street, Boston, Mass. It is a Boeing Fighter, shown in picture No. 4. The interesting part about this picture is that it was made with a new method of lighting which practically eliminates all traces of shadows and helps considerably in giving depth to the picture.

Many pictures of fine ships are received which cannot be published because the photography is so atrocious. May we prevail upon readers to send in good photographs which will do justice to the fine work on their models. A good model will give the wrong impression if the photograph is poor. Remember, one of the points that might be of interest to photographers is that a gray day provides the best time for photographing your models. If a ship is placed in the sunlight there are bound to be very deep shadows and strong highlights. On a gray day the difference between the shadows and the light spots is not so great and more of the details show up.

Another fault is that many of the pictures are not in focus. Be sure to have your model placed at the correct distance from the camera in order that the picture will be clear. Use a portrait lens if you wish to make close-ups.

Another important feature is using a white background for a dark ship. No irregular shaped object should be in the background. Use a gray or black background for a white ship. A background of bushes, trees, grass, etc., has the effect of camouflaging the details of a ship. Such a picture is worthless for reproduction purposes.

We will look forward to receiving some improved photographs in the future from Air Ways Club members.

Horace Dikel, of Crookston, Minnesota, Box 238, sends us picture No. 5 of a very interesting flying job. This plane is of the B class and is twenty-nine inches in wing span. The chord is 3 1/2" which gives it a wing area of ninety-nine square inches. The job weighs three ounces and is powered with fourteen strands of rubber, which drives a twelve inch propeller. Dikel tells us that it flies twenty-seven miles per hour and lands so fast that once when landing in a plowed field, it bounced three feet into the air. He says this is the only bad landing it has had in forty flights. Dikel started a model airplane club last winter by getting six boys together. They started their activity by building a plane of eighteen inches wing span, designed by Dikel. Only four were finished and only one flew. The construction of the others were too sloppy. Evidently four of the six became discouraged,

(Continued on page 54)



Pict. No. 11. Frank Leet and his Wakefield model that has flown 3 min., 25 sec.

comes from its builder, Louis Heinzerling of 479 Mulhollen Drive, Monroe, Michigan, who has been building models for ten years. The ship is built to 3/4" to the foot

Cleveland

Read What Others Say

"I thought all Kits were alike until I bought a Cleveland-Designed Kit. Now you couldn't hire me to buy anything but a C-D!"
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"Am well pleased with the wealth of detail found in Cleveland models."
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"C-D models are clearly described. Completely Detailed. Correctly designed, and Competitively De best."
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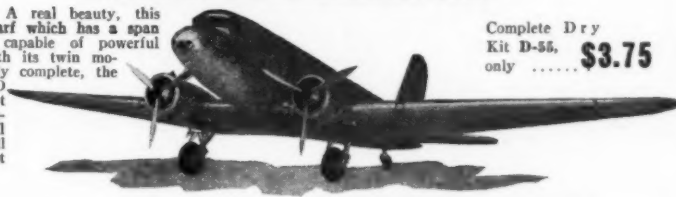
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SPECIAL GRUMMAN "GULFHAUK" Major AL WILLIAMS FAMOUS SHIP

This famous all orange beauty is piloted exclusively by our own famous Maj. Alford J. Williams (to whom we are indebted for assisting us in securing design data). It is beautifully detailed and striped in blue with a white outline, the upper wing being painted in a "sunburst" design, being exceptionally attractive. Flies very well, having plenty of wing area. Both stationary and retractable landing gear (for exhibition and first prize contest winning). Complete Dry Kit R-70, only... 85c



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The daring stubby design that took first place in Thompson Trophy Race of 1932. Major "Jimmy" Doolittle flew the course at an average of 252 M.P.H., which was the Thompson "high" record until the Caudron record of 1936. Make this unusual flying model. Span 18 1/2". White with red scalloping. Complete Dry Kit SF-27..... \$1.95

Complete Dry Kit D-27 (12 1/2" span), 65c



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This beautiful little two place job is well known to modelbuilders everywhere and our model looks as pretty as does the prototype. Span of course 20", suggested coloring, all silver, like the prototype. Model stable and fast. 65c
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High speed U.S. Navy shipboard fighter. Designed for advanced modelbuilders who want a thoroughly detailed scale model and one which, when completed represents the acme of perfection in model building. Span 23 3/4". Silver, yellow, gray and red. Complete Dry Kit SF-49..... \$2.95

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(Formerly P-30). A blue and yellow beauty, and a "wow" for flights. Dry Kit R-56, only... 50c



RACE PLANE "MR. MULLIGAN"

This really is a "beaut" for flights, and a typical C-D authentically detailed job. In big demand, as it is one of the easiest of Cleveland-Designed kits to build. All white, 20" span. 65c
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Dry Kit
SF-52
23 3/4"
\$2.95



CURTISS HAWK P6-E FIGHTERS

Hard to tell this actual 20" model photo from our 3/4" model. Full of typical C-D authentic features and details. Speedy flights. 65c
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Complete Dry Kit SF-21 (21 3/4" span), \$2.50
Complete Dry Kit D-21 (15 3/4" span), 95c



THE CLEVELAND AMPHIBION AN AMPHIBION NEVER YET EQUALLED

The "perfect" kit for warm weather fun, especially for vacations. Will take off water as easily as water rolls from a duck's back and that's mighty fast. Long steady flights are always to be expected. Twin motors. Span 28". Will also R.O.G. as the wheels are quickly dropped. Without liquids. 65c
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"I have found your models easy to assemble, and accurate replicas of their prototypes." Albany, N. Y.

"Your Bearwing Sport Kit is the easiest model I've ever tackled." Pine Grove, Pa.

"Have been a modelbuilder for years, but have never found any models as complete as yours." Greensboro, N. C.

"Had it not been for the great amount of detail and accuracy found in a Cleveland Kit, I would never have won my model trophy." Ft. Wayne, Ind.

"My C-D model won first prize in the open model building contest at the Canadian National Exhibition." Toronto, Can.

"In my 6 years of modelbuilding have used many different companies' Kits, but have not found one so true to scale and so authentically as a Cleveland." So. Orange, N.J.

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C-D LAKES SPORT TRAINER

Flying either as a flying or exhibition flying model, push wheel shoes also—span 20", length 15 1/4", and shape and balance orange, except black details.

re let the kit in detail. The complete kit contains 297 individual parts printed out, or a grand special position to standard parts always supplied will be standard. Pusher hubs, bearing drilled to fit C-D type. Nose block (front) drilled to fit C-D type. Thruster wires, black tissue for lettering, instrument at Lake, and last, but most important, a full sized, photograph and instructions. Truly the "Trainer" for serious flyer for she's the beautiful \$1.95
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initiate airplanes. Not just something that that makes" marvel at their realism. Kits are spans of the SF 3/4" scale run from scale 1/8" to 12 1/2".

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23 Turner's W. Wma.....	2.35	.65	
Curtiss F11C-2.....	2.95	1.10	
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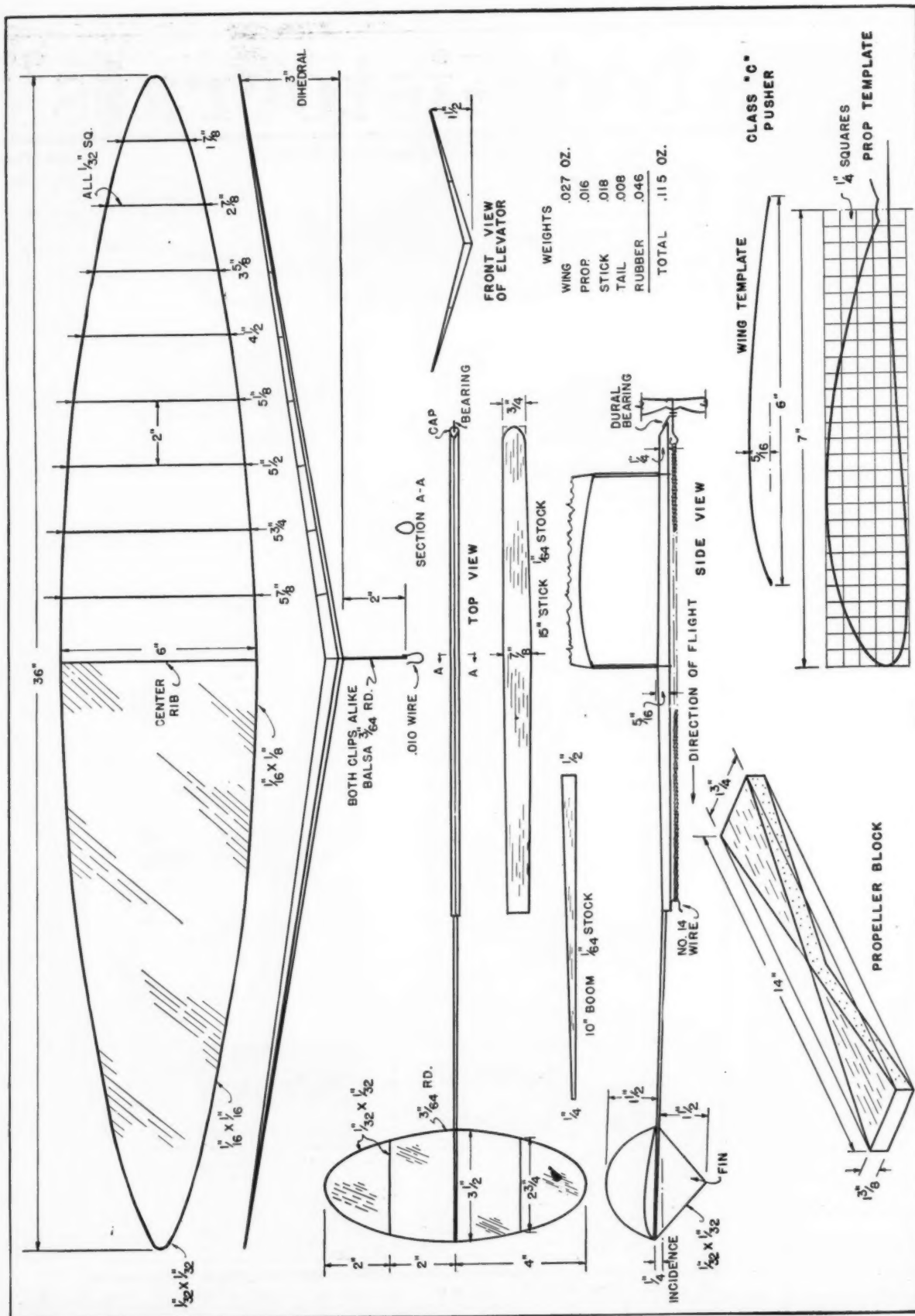
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Building A Successful Indoor Pusher

How Several Indoor Pushers Have
Been Developed and Data That Will
Enable You to Build One

By JIMMY THROCKMORTON

IMPETUS in indoor pusher building has come from three major points. The late Al Mott of Detroit did much to popularize that type of model there and nationally. His pusher was the only one that ever placed high in the indoor Stout Event. Sam Balkan of the Massachusetts group of modelers was an exponent of this type of design in his time. More recent and final development in pusher flying has come from the Atlantic City group of builders. It was here that the forward rudder type of indoor pusher was developed by Merrell Malley and the author. This type of pusher rudder has since spread to Philadelphia and other points.

One point of interest concerning pushers has been learned. They will fly well without any sort of rudder, but they fly **BETTER** with a rudder in reference to climb control and the execution of a consistent circle; two very important factors when flying indoors with a limited ceiling. A rudder placed in the rear of the model near the wing and propeller is usually blanketed and is inefficient and also tends to make the model unstable. Therefore if a rudder is used it must be in the front, even if it seems to be theoretically impractical.

During the past year or so I have experimented with three types of indoor pushers, each one improved and changed due to experience gained with its predecessor. The second one is shown on the opposite page. The main differences between the first and second model are lighter construction throughout, a different propeller and smaller rubber. Also no incidence is used in the main wing. The present ship, the third one, is identical with the second except for the wing. During tests with the second ship the wing covering was badly damaged. It was rebuilt and recovered with a weight saving of .003. Six ribs were taken out and a double dihedral was used. This model with the improved wing is shown in the photographs. Stability was also improved. The lightening of the wing had the same effect as was had when the rudders were first moved from the rear

to the front of the elevator boom. This effect was a lower center of gravity. This point only hints at what a very light but efficient microfilm-covered propeller will do for the indoor pusher. Indoor king tractor had better watch out for its laurels.

Bill of Material—All measurements are in inches and material in balsa unless otherwise stated.

Motor Stick—One blank 15 x $\frac{7}{8}$ tapered to $\frac{3}{4}$ at ends. One rear cap $\frac{1}{32}$ x $\frac{5}{32}$ x $\frac{3}{4}$. One front cap $\frac{1}{32}$ x $\frac{5}{32}$ x $\frac{5}{16}$. One front hook No. 14 piano wire. One dural thrust bearing. One brass washer.

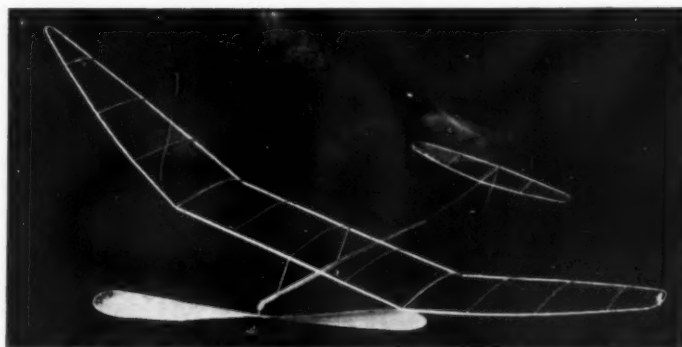
Wing—Four spars slightly rounded $\frac{1}{16}$ x $\frac{3}{8}$ tapered to $\frac{1}{16}$ x $\frac{1}{16}$ x 16. Two wing tips $\frac{1}{32}$ square x $4\frac{5}{8}$. 17 ribs cambered and to sizes shown in drawing. Two balsa clips $\frac{3}{64}$ round x 2. Two pieces No. 10 wire to fit in ends of balsa clip holders.

Empennage—One blank for boom 10 x $\frac{1}{2}$ tapered to $\frac{1}{4}$. One elevator including two spars, $\frac{3}{64}$ round at center tapered to about $\frac{1}{32}$ at ends. Three ribs for elevator $\frac{1}{32}$ square, one $3\frac{1}{2}$, two $2\frac{3}{4}$ long. One rudder made from $\frac{1}{32}$ square balsa, one piece $2\frac{5}{8}$ long and one piece $1\frac{3}{8}$ long.

Power Plant—One propeller carved from block $1\frac{1}{2}$ x $1\frac{1}{4}$ x 14. One motor brown rubber, $\frac{3}{32}$ flat, 34 long, tied in loop. One shaft No. 14 piano wire. One washer.

Construction

First make your microfilm so it will be ready when the model is ready for covering. A ready mixed solution purchased at any model shop is quite satisfactory.



A rear view of the "pusher." Note rudder at the nose.



The indoor "pusher" which recently made a flight of $16\frac{1}{2}$ min. with 1900 turns on the rubber, at Philadelphia.

Start with the motor stick. First make a former out of a stiff piece of balsa or other handy hard wood. Make it of slightly less diameter than the motor stick specifications. Soak the motor stick blank in warm water and bend over the former, taking care that the seam is straight. Hold in place with stripped cloth and let dry. Cement the seam and balsa end cap in place. It is finished after the bearing and rear hook are in place with a light sanding.

For the wing, cut the spars to size given in bill of material. Use $\frac{1}{16}$ sheet balsa for this purpose. Cut the ribs from light $\frac{1}{32}$ sheet stock. Next make the two wing tips. Bend the tips over the bottom part of an electric light bulb. Make a full size layout of the wing using the plan as your guide. Pin this on your work table and assemble the various parts of the wing. Use common straight pins to hold them in place. Cement the joint and let dry. In the meanwhile make the two wing clips. The wing has 0 angle of incidence so both clips are identical. To cover with microfilm, place the wing frame on a microfilm-covered hoop, using water as an adhesive. Moisten the wing spars, center rib and tips. Trim excess microfilm off with a hot wire. Crack the spars for the dihedral and reinforce with cement. Attach the wing clips and the wing is finished.

Now for the empennage. Make the hollow boom the same way as you made the hollow stick. A piece of $\frac{1}{16}$ " diameter wire will serve as a former. Bend the elevator outlines over an electric light bulb. Cut the cambered ribs from $\frac{1}{32}$ " sheet balsa. The rudder goes under the elevator and is put on first. Cement the balsa pieces in place, let dry and cover with microfilm. Make and cover the elevator in the same manner as you did the wing. Cement dihedral angle firmly when you cement elevator to tail boom. Now cement the tail boom to the end of the motor stick, taking care to keep it in alignment. Give the elevator $\frac{1}{4}$ " incidence.

Finish with the propeller. Carve the propeller by cutting away the sides as shown. When this is done,
(Continued on page 54)



Build and Fly This Miniature "Cub"

(Continued from page 19)

between stabilizer ribs S-1 and S-2. See plan view on Plate No. 7. Balsa fillet pieces A-A are cut from 3/32" sheet to the design shown and cemented in place as indicated in the plan view of the stabilizer. Fillet pieces B-B are also cut from 3/32" sheet and are cemented as shown, both above and below the rear section of the frame outline. The front view of the fillet detail shows the manner in which these pieces taper.

Details of Wing Assembly

The first step in building up the wing, is of course, cutting out the ribs *very, very carefully*. Study the wing plan and familiarize yourself with all of its details. There are 28 ribs throughout the entire wing and, all, with the exception of R-1 and R-4 must be cut from 3/32" medium grade balsa. Ribs R-1 and R-4 are cut from 1/4" and 3/16" sheet respectively. However, before cutting any of the ribs to shape, make a typical rib template out of a sheet of 1/32" aluminum. This will serve all the ribs with the exception of R-5 of which a separate one may be made if the builder finds it necessary. Rib R-6, at the extreme tip of the wing is made by cementing a piece of 3/32" stock in position and cambering it to shape with a sanding block.

In laying out the main wing spars No. 1 and 2, use the typical web joint as shown on Plate No. 6.

Allow the web joints to dry completely before cementing the balsa tie plates all of which are cut from 1/16" sheet hard balsa, the hardest obtainable, and which are then cemented to both front and rear of the main wing spars. It is advisable to place quite heavy objects over the laminations and allow several hours to dry thoroughly.

In the meantime all the identical ribs are sanded to shape carefully. A portion of the upper and lower part of the leading edge of each rib is cut in recess of 1/32" for eventual sheet balsa covering. This must be done slowly and carefully keeping the recess in each rib constant. The next step is to mark off the position for the notches on each rib, which, when cut away will accommodate the "I" beam type spars also referred to as cap strip spars. The depth of the notches vary slightly between spar 1 and 2 so care must be taken to keep the depth uniformly correct. Measurements for the depth of the cap strip spars may be taken directly from the airfoil section drawing on Plate No. 5. When this has been completed all the ribs are then cut in three sections for final assembly.

Spar No. 1 is laid out flat on the work bench. The positions of the main and false ribs are marked off. Now, to the front of spar No. 1 cement all the leading edge sections of the false and main ribs, being watchful not to allow any of the members to fall off to one side and possibly hardening that way. The next procedure is to cement all the trailing edges of the rib section to the rear of spar No. 2. After both units dry thoroughly, stand

them upright, using large pins as props, and spacing them apart correctly, proceed to cement the center sections of the ribs into position. Use the cement generously in all joinings and check throughout for perfect rib alignment. The next step is to cement into position the entire set of cap stripping spars with generous applications. Note the necessity of beveled edges on both upper and lower cap strips. The leading edge spar is next to be cemented and carefully sanded to conform with the airfoil section. The trailing edge is fitted into position lastly and sanded to the typical section shown on the plans. Sheet balsa 1/4" thickness is cut and sanded to shape and attached in three sections to complete the wing tip detail. The sheet balsa covering for the leading edge, starting at R-1 continues out along the wing, terminating at R-5. The remainder of the tip is covered with a separate section. In applying the sheet covering, use the cement along the rib recessions quite generously. Small model making pins may be partly inserted through the sheet to assist in holding the curve until the cement hardens sufficiently to warrant their removal.

The addition of Formér W-1 shown in full size on Plate No. 5 is made by cementing it over the trailing edge as shown in both the top view of the wing and side view of the airfoil section on Plate No. 5. A single strip of hard balsa 3/16" sq. is cemented into the former slot and joined to the rear spar 2. The portion on either side of this strip is covered with 1/16" sheet, which, when cemented into position and fitted tightly will assume a slightly concave shape aided more so when gently rubbed with sandpaper.

The wing fillet construction detail is shown in three views on Plate No. 6. Make a cardboard template of the fillet views first to insure accuracy of construction, these portions being very important in carrying out the design of the windshield detail. Sand both parts to shape identically.

Before attaching the fillet pieces in position, a piece of sheet balsa measuring 1/8" x 1 1/8" x 3/8" is cemented flush against the front of spar No. 1 as indicated on the plan view of the wing, Plate No. 5 and in the front view of the wing structure shown on Plate No. 7. Afterwards, the fillet pieces are cemented flush against the aforementioned part. See center section detail Plate No. 5.

The shear blocks used fundamentally to increase the strength of the wing spars and prevent possible warping are cut to the required amounts and shape and cemented at intervals indicated on the plan view of the wing. Note the positions especially for the brace blocks D and E and brace blocks F and G which compose the strut fitting detail mounting blocks. The cross sectional views showing their respective positions is clearly illustrated on Plate No. 6. Brace blocks D and E are cemented to the front and rear of spar No. 1 at section point C-C (top view wing plan) while brace blocks F and G are cemented to the front and rear of spar No. 2 at section point D-D top view wing plan. However, before attaching the blocks, drill 1/16" dia. bolt holes in their

proper places and check for accuracy when lining them up.

Wing Struts and Fittings

Full size drawings for the aluminum strut fittings B are shown on Plate No. 7. Shape four (4) fitting patterns out of 1/32" sheet aluminum and bend along the dotted lines indicated for that purpose. The "V" shaped struts are cut to proper size from balsa and streamlined in the conventional manner. At the extreme outward tips they are recessed 1/32" so that the bent fittings B may be cemented as shown and bound with strong white thread. The lower strut fitting A is cut to shape from 1/32" sheet aluminum of which a full scale drawing is given. Two fittings are attached to each set of struts, above and below. Before attaching, drill each fitting for a 1/16" diameter hole. The fittings are then attached to the lower tips with cement and bound with white thread. Of course, don't neglect to drill a 1/16" diameter hole through the struts themselves. Now, strut fittings C of which eight (8) must be made, are cut to shape from 1/32" sheet aluminum and drilled for 1/16" diameter holes. These fittings are then fastened to the fitting brace blocks at sections C-C and D-D using three No. 2-56 bolts to hold each pair of strut fittings (C) into position. Tighten up on all the nuts where bolted fittings are made.

Landing Gear Assembly

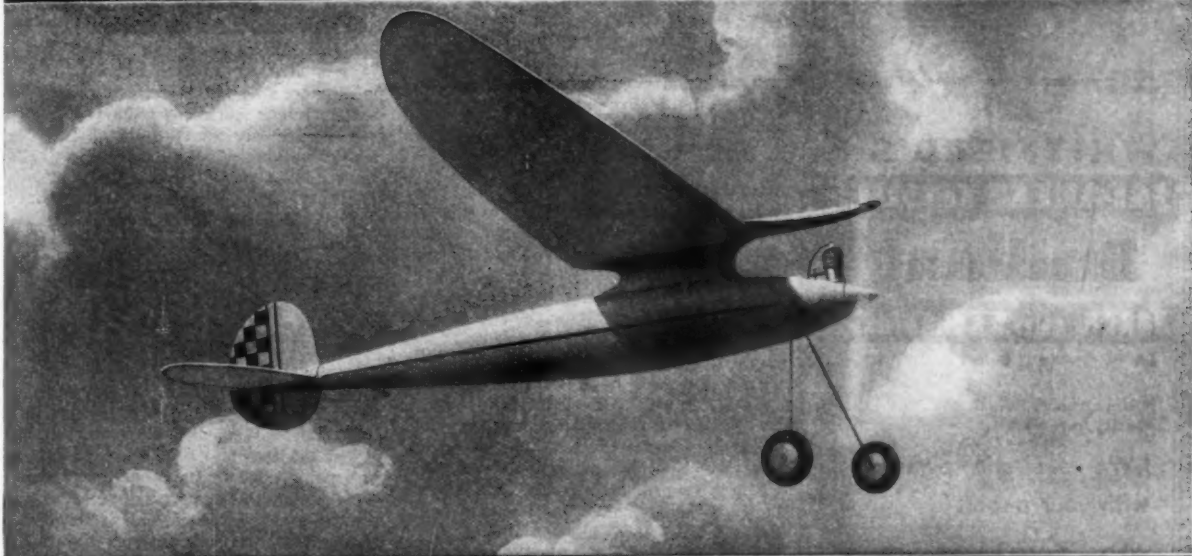
The main frame structure of the landing gear assembly is bent to shape from a single length of 3/32" diameter steel wire. About five feet of wire is required. However, shaping the landing gear is in itself quite a tedious and difficult process. On several occasions the writer has had the experience of having the wire snap at a critical point almost within sight of the frame completion. It is therefore suggested that you play safe and order additional lengths of wire just in case. . . . The top view of the landing gear plan Plate No. 6 shows where the starting point of the landing gear is begun. Place the wire into a heavy vise and tighten securely. Then, with the aid of a pair of heavy square nose pliers carefully form the curved portions. Bending the wire cold will be found quite easier than heating it—strange as it seems. The tendency to snap when heated is always present. Don't become discouraged if after a couple of times the wire snaps. The writer ran into the same trouble. But soon with a little experience and care you can fashion a complete landing gear frame.

The top and front views of the landing gear frame indicate the positions of additional frame members which are bound with copper wire at strategic points and soldered carefully. Note the positions of the brass washers which are soldered to the main axle. Sheet balsa fairings are cemented to the landing gear sides as shown. These fairings are laminated pieces of 1/16" sheet.

The wire tie down hooks are bound with 1/32" dia. copper wire and soldered carefully in the positions shown by the three landing gear views. Rubber strands are placed at the points indicated and are

(Continued on page 59)

NOW.....



THE VALKYRIE GAS TYPE RUBBER POWERED MODEL AIRPLANE



The 2 pictures above illustrate the original full size "VALKYRIE" gas model. This is one of the most unusual gas models ever made and the finest example of model streamlining yet produced. This model made a remarkable performance at the 1937 Nationals and was awarded second place.

WINGSPAN 24 in. LENGTH 15 in. WEIGHT 1 1/4 oz.
DESIGNED BY INDOOR CHAMPION CARL GOLDBERG
 Introduced last month, this new and remarkable model has already started to make a name for itself. This new type construction has attained tremendous popularity and this super-streamlined model is another example of these unusual gas type rubber powered models.

LOOKS, FLIES and SOUNDS LIKE A REAL GAS MODEL!
 Has super-streamlined fuselage, movable control surfaces and shockproof landing gear!

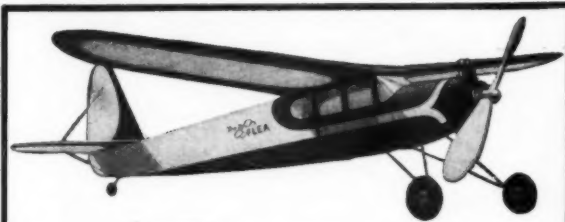
The "VALKYRIE" incorporates all the attractive features and outstanding flying characteristics of its gas model original. It is a super-streamlined, graceful, efficient, durable and consistent flyer that can be built easily and quickly by any model builder, requiring only 4 or 5 hours to construct. It is sturdily built with continuous one piece wing root built into the fuselage and firmly attached to under side of wing, making an exceptionally strong assembly and assuring great durability. Model also includes the "Ratchet", a device that creates a sound resembling the hum of a real gas motor. The dummy motor is exceptionally realistic, and when this model is in the air it cannot be distinguished from a genuine gas model. Beautifully colored with yellow fuselage and tail, black arrow on body, colored squares on rudder and yellow wing with attractive black and red flashes.

FLIES 1/2 MILE (2500 FEET)

The flying qualities of this model have been tested repeatedly and proven efficient. The design is unusual and the high wing mounting and dihedral angle assure perfect performance under all ordinary circumstances.

KIT is COMPLETE INCLUDING SPECIAL BROWN CONTEST RUBBER

Contains everything required to build this model 100% complete. All ribs, bulkheads, fairings, and curved parts clearly printed on selected quality balsa; strip balsa carefully cut to accurate sizes; ready made wood cylinder with spark plug in one piece; all wood parts for constructing crankcase, exhaust pipe, air intake, throttle, etc.; pair of streamlined wood wheels; Tru-Pitch 7 in. machine cut balsa propeller; liberal quantities of cement, clear dope, Brown contest rubber; landing gear wire; flat and cup washers; 3 sheets of colored tissue; sheet aluminum; motor hooks; and all necessary metal for building the "Ratchet" motor-hum effect; soft wire for movable surfaces; also a set of easily understood full-size plans with detailed instructions including the construction of the dummy gasoline motor. Everything needed to complete the model and make construction as easy as possible.



GAS TYPE RUBBER POWERED MODEL AIRPLANE

WINGSPAN 36" LENGTH 28" WEIGHT 4 OZ. MOVABLE CONTROLS ON RUDDER AND ELEVATOR. SHOCKPROOF GAS MODEL TYPE LANDING GEAR. PNEUMATIC M & M RUBBER WHEELS. NEW TYPE BALL BEARING PROPELLER WASHER. SPECIAL BROWN CONTEST RUBBER. ADJUSTABLE WING WITH NEW TYPE CLIPS.

HAS FLOWN MORE THAN 2 MILES—OVER 10,000 FEET

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COMPLETE KIT including M & M PNEUMATIC WHEELS, ENGINE PARTS and PROPELLER

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This "VALKYRIE" model is repeating the popularity record of the "Flea" (shown at left). It is a sensational example of super-streamlining and forecasts future development in model airplane building. You will surely want to build this model.

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How to Build the Transition Model

(Continued from page 28)

tion. A gas model wing that is actually under-stressed might be considered by the novice as a strong enough member, but it is well to remember that stresses on a gas model wing during flight greatly exceed those of the conventional rubber-powered model.

The writer has seen fine gas jobs collapse in the air. Their builders thought the wings were strong enough, but they forgot a gas job forces its wings to support around 8 pounds in a dive compared to a rubber model's eight or ten ounces. And models will dive!

Since the built-up weight of the TP-6 is a good half pound, this machine in a dive exerts a force of about 2 1/2 pounds, which weight must be supported by the wing!

The TP-6 wing has two main spars and a third spar which runs over a little better than 1/3 of the central portion of the wing where stresses are greatest. The two main spars are connected not only by the ribs, but by 4 compression members. Short auxiliary spars of smaller wood extend from the second tip rib to the tip outline.

Begin the wing by first laying out a spar jig. Draw the spar full size, as viewed from the front, set in your guide nails and cement the right and left sections to the center section. Make two spars in this manner.

When the cement on each has thoroughly dried shape the four center reinforcements out of 1/16" sheet balsa, cement one on each side of the spar in its proper place and let dry under pressure of clamps or books. These reinforcements should be bound with thread. Using the same spar jig, steam and bend the center spar and allow it to remain in the jig to dry until installed in the wing.

Next prepare three rib templates from the drawings printed here. This section is of the high speed type, one of the author's own design, evolved after several years' experimentation. This section will allow high speeds and good lift, yet will give a fairly low landing speed in spite of high wing loadings. The TP-6 lands at about 20 m.p.h.

Make 13 ribs of type A, the three spar variety. Of type B, for two spars, you will need 10. Only 2 ribs of type C are needed. Make each of these groups identical in outline. The material is 1/16" sheet balsa.

To begin wing assembly, lay out a full sized wing drawing, make a jig along the spars and assemble one-half at a time. Use sufficient, but not an excess of cement at each joint. Line up each rib with the drawing you have made, also check alignment so each rib will be perfectly vertical to the spars.

When one side has dried, repeat the process on the other side.

Fit ribs into the center section last. Because of reinforcements, make front and rear spar slots at this point 1/8" wider than the rest. To do this take no more than 1/16" off each side of the original slots to retain the proper rib setting relative to leading and trailing edges.

The trailing edge is more or less a tailor made proposition and if properly cut

will fit easily and strongly. Take a piece of 1/8 x 1/2" balsa, cut a length sufficient for each side of the wing as well as a shorter piece for the center section.

Now draw a line through the center of each piece on the 1/2" side. From this line, sand one edge to a thickness of 1/32" along its entire length. This is the extreme trailing edge. Now mark off, on the opposite side, still 1/4" thick, every inch. At each such inch mark, cut a slot 1/16" wide and 1/4" deep for the rib tails.

Lay the wing down on one side and slip the tail of each rib into its proper slot, making any adjustments to fit as you go along. If the work in rib placement is accurate, and your measuring and cutting accurate, the trailing edge will go on easily. Cement each rib. When the opposite edge has been cemented, prepare a center section trailing edge in the same manner and cement all its joints well.

Leading edge is a piece of 1/8" square balsa set in on one corner and cemented at each rib. Fit in one wing section at a time, finishing up with the center section. When the cement has dried, sand off the protruding edge to its proper nose shape. Now set in the compression members as shown in the drawings and fit the center spar in place. Be sure this spar fits snugly, as its purpose is that of a safety spar.

Set in the two ribs, C, but first notice that the rear spar has been tapered to a section 1/8" square. This taper begins at the last full sized rib on each tip. Cement the 1/8" square tip spars into place.

Wing tip stock is 1/16" square bamboo, bent to form the proper outline as shown in the drawings. Cut the leading and trailing edges to fit the contour and cement the joints well. For added strength wrap 1/4" wide strips of Jap tissue around the joints. Two or three times around the parts will suffice. Coat these bindings with a film of cement.

The wing frame completed, check it carefully for alignment; steam out any distortion. Wing saddles will provide additional practice in wire bending. The material again is No. 24 music wire, enough to make two saddles, each to be identical.

Begin bending with the upright prong and when one side is formed, slip on a piece of rubber radio tubing, long enough to fit across the fuselage top and extend 3/16" down each side of the saddle. This tubing will make the wing hold better than bare wire and will prevent the wire from cutting into the body.

To install the saddles, center each and with a pin drill a hole deep enough to take the aforementioned prong. Remember this important note: set the rear saddle feet exactly 1/32" into the rear spar. When the resting place of the feet is found, cut each shallow depression with care as the precision of this operation regulates the accuracy of the wing's incidence setting. This depth will provide a positive incidence of one degree.

The front saddle may be attached by inserting the prongs in previously drilled holes, resting the feet against the spar. Cement the feet well and bind neatly with thread.

Set the wing frame aside for a while now in a safe place and draw a full size

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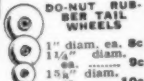
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8 ft. Lengths	8 ft. Lengths
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1/4x1/4.....\$.06	1/16x3.....\$.14
1/4x1/4.....\$.08	1/4x2.....\$.15
3/16x3.....\$.04	1/4x3.....\$.20
3/16x3.....\$.06	3/16x2.....\$.18
1/2x1/4.....\$.08	3/16x3.....\$.25
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DO-NUT RUBBER TAIL WHEELS
1" diam. ea. 8c
1 1/4" diam. 9c
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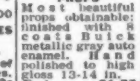
FLIGHT TIMER
"MADE LIKE A WATCH"
Small size—weight 2 1/4 oz. Adjustable 0 to 120 sec. silver contact points, vibration proof, accurate, easily mounted in any position. Each \$3.00



NEEDLE VALVES
For all Models of Cyclone Engines. Each \$3.00



TRU-FITCH GAS MODEL PROPS
Accurately carved with hole drilled. Made of clear hardwood: 13 and 14 in. sizes. Look for the name SCIENTIFIC TRU-FITCH stamped on every prop. Each \$3.00



M&M GAS MODEL PROPS
Most beautiful props obtainable: finished with a glossy black metallic gray auto enamel. If a d polished to high gloss 13-14 in. Each \$1.75



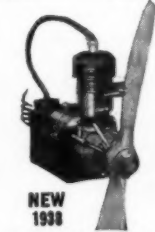
SCIENTIFIC GAS MODEL FINISHES
Clear Nitrate
Dope
Colored Nitrate
Dope
Nitrocellulose
Gas Model Cement
Bamboo Paper
Camellia
Banana Oil
3 oz. bottle.....\$3.50
1 pt. can.....\$10.00
1 qt. can.....\$15.00



SCIENTIFIC GAS MODEL FINISHES
Clear Nitrate
Dope
Colored Nitrate
Dope
Nitrocellulose
Gas Model Cement
Bamboo Paper
Camellia
Banana Oil
3 oz. bottle.....\$3.50
1 pt. can.....\$10.00
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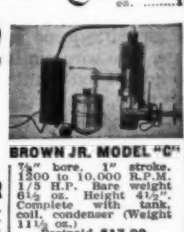
BROWN JR. MODEL "C"
7 1/2" bore, 1" stroke, 1200 to 10,000 R.P.M. 1 1/2 H.P. Bare weight 6 1/2 oz. Height 4 1/2". Runs 20 min. on 1 oz. fuel. Complete with tank, coil, and condenser. (Weight 11 1/4 oz.) Postpaid, \$21.50



OHLSOON MOTOR
7 1/2" bore, 1 1/8" stroke, 500 to 14,500 R.P.M. 1 1/2 H.P. Bare weight 6 1/2 oz. Height 4 1/2". Runs 20 min. on 1 oz. fuel. Radial or side mounting. Complete with tank, coil, condenser. (Weight 11 1/4 oz.) Postpaid, \$18.50



ZEPHYR SILK
Strong and light finest grade for models. Postpaid \$12.00



BROWN JR. MODEL "C"
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MIGHTY MIDGET Upright
Kit \$9.85
Assembled motor 14.00
Bore 7/8" Stroke 13/16" 500 to 7500 R.P.M. Bare Weight 6 1/2 oz. 1/2 H.P. Height 4 1/2". Engine runs app. 20 min. on 1 oz. of fuel.



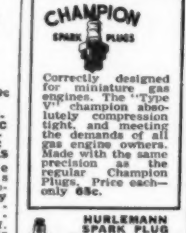
GWIN AERO Upright
Kit \$11.35
Assembled motor 17.50
Bore 7/8" Stroke 13/16" 500 to 7500 R.P.M. Bare Weight 6 1/2 oz. 1/2 H.P. Height 4 1/2". Engine runs app. 20 min. on 1 oz. of fuel.



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You'll be surprised at the new pep and power your engine will have.



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With Filter.....\$3.00



CHAMPION SPARK PLUGS
Correctly designed for miniature gas engines. The "Type V" Champion absolutely compression tight, and meeting the demands of all gas engine owners. Made with the same precision as the regular Champion Plugs. Price each—only 65c.



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Kit \$10.10
Assembled motor \$17.25



GWIN AERO Inverted
Kit \$11.60
Assembled motor \$18.25



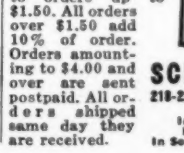
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Light weight, large or small. Each.....\$3.00



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Complete set of 2 brackets and 6 set screws. Complete.....\$5.00



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Complete metal nosing for any Gas Model. Gives real plane appearance.



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KIT \$10.10
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INVERTED ENGINE
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Assembled motor \$18.25

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In England: 21 & 23, Newman Rd., Kirkham, Preston, Lancs.
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The "IMP"

Perfect Power Twins

AIR COOLED OR WATER COOLED

THE ONLY Midget gas Engine having a one-piece cast aluminum crankcase and cylinder, eliminating leaky gaskets and assuring maximum compression and low gas consumption. The 4 pt. radial mounting permits complete control of thrust and torque. Rotary valve type; bore 51/64"; stroke 53/64". High speed bronze bearings, streamlined exhaust, block tested and certified H.P.—0.190. Only four moving parts. R.P.M. from 320 to 11,906 according to propeller or fly wheel used.

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The "INTERMOTE"—For model airplanes from 3 to 8 ft. wingspan. Weight, bare 6 1/2 oz. complete 10 1/2 oz., equipped with spark plug, coil, condenser, fuel tank and aluminum engine mounting. Postpaid,..... **\$15.00**

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(These motors made by American engineers and craftsmen who have sacrificed mass production for perfection)

Pat. Pend.



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S-2 2-cylinder, wht. 2 1/2 oz. complete with generator, feed line and safety clip. Postpaid..... **\$4**

V-4 Illustrated above, 4-cylinder, wht. 3 1/2 oz. with generator, feed line and safety clip. Postpaid..... **\$6**

REARWIN SPEEDSTER

64 in. Wingspan Air, or Rubber Motor 1/6 original size Can be powered with Gasoline, AC:CO Gas, Compressed

Complete "Definitely With" Kit Including fully finished notched and webbed Paulownia wing ribs, colored bamboo paper, movable and controllable ailerons and rudders, 12" Paulownia wood propeller and 13" Sakura gas propeller, 3" cork tired aluminum balloon wheels and many other exclusive features in..... **\$4.95**

Postage and Packing 30c

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"INTERMOTE" gas engine with REARWIN SPEEDSTER kit, extra 13" G.A. gas prop (value \$1.00) and Timer (value \$1.75). Complete P.P..... **\$20.00**
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An exact scale model of a famous outboard motor

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Weight 5 oz., height 5", propeller diameter 1 1/2", engine propeller gear ratio—2:1, 1640 R.P.M. Operated by flashlight or similar batteries, in series or single, to supply 1 1/2 to 6 volts. Postpaid..... **\$3.50**

Including a completely finished and painted 1 1/2" cedar and mahogany single step speedboat with battery boxes. Postpaid..... **\$7.00**

(Boat alone—\$4.00 p.p.) Can be used with any gas motor up to 6 c.c.

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set of rudder-stabilizer ribs. You will need a total of 13 ribs of the following sizes: 3 of type A cut from 1/8" sheet balsa, 2 more of A, 3 of B and 3 of C cut from 1/16" sheet balsa. Drill the spar holes in each rib with care and discard any ribs which may split in this process. Rib D is the tail end of rib A, also of 1/16" sheet.

Make the rudder first. From the drawings, scale a full sized layout and cut the two spars to their correct length from 1/4" square balsa. Round the entire front spar to make a dowel, but round only that part of the rear spar which will project above the fuselage in the rear.

Accurately mark off the rib placement on each spar and slip the ribs over the spars to their proper positions. Line the setting with the drawings you have made, set the rudder in place on the fuselage and true up the work. When you are satisfied that the rudder is correct, cement each rib to its spars.

The portion of the rear spar running along the stern post is still square. Place rib D in line and cement. The rudder outline is made of bamboo 3/64 or 1/16" square, preferably the former size. It is cemented to each rib over which it passes as well as the spar tips. Spar tips should be flattened. The bottom of the rudder curves upward to meet the trailing edge. This curved portion may be bent to shape from 1/16" sheet balsa. It tapers in width at the bottom of the fuselage to meet the trailing edge and should conform with the rib section. Put in the 1/16" square balsa diagonal.

Study the full size rudder attachment drawing before you attempt to make the fittings. The rear pin, note, extends straight down and fits snugly into the brass tubing previously cemented to the stern post. This is the pivot point on which the rudder will swing if an adjustment is made on the rudder plate. The wire pin has a slight bend into it to keep it tight in the tube.

The rudder plate, shown full size in the drawings, is made of thin aluminum sheet. Referring to the rudder fitting drawing again, notice how the front rudder pin goes through the holes in the rudder plate, straight down at first, rudder on its leading edge, then by levelling the rudder and sliding the rear pin into the tube the attachment is made rigid, yet easily adjustable. The drawings shown here are taken from the original TP-6 and should be followed closely.

Cement the feet of each fitting to the inside of the 1/8" thick rib, and if plenty of cement is used binding will not be necessary.

The important thing here is to have the plate center hole on a direct line drawn between the thrust bearing and the rear tube center. Do not under any circumstances cement the rudder in place as adjustments available through the fittings will be used many times during the life of the model.

The stabilizer, of generous area, is built in much the same manner as the rudder except that its setting is permanent. This feature calls for extreme care in assembly. First make two spar dowels out of 1/8" square balsa, the front spar 11 1/4" long, the rear spar 12" long.

Next, drill the rear spar holes in the

sheet side plates between stations G and H. Proceed in this manner: Find a point for the rear spar exactly 1/4" from the trailing edge of the stern post that is 2" from the outside edge of the bottom longeron. If your construction has been accurate, this point will be in line with the 1/4 x 1/8" shaft of the "T" sectioned stern post. Drill this hole 1/8" in diameter right through to the other side, but take pains to keep this hole in line or the stabilizer will not be in line with the wing.

Drill a similar hole for the front spar. Mark off a point centered 1 1/2" from the rear spar hole and 1 15/16" from the bottom longeron, measured from its lower edge. Slip the spars into their proper holes and line them up with each other and with the fuselage. They must be perfectly horizontal. Cement the spars from the inside of the fuselage only.

To assemble the ribs mark off their stations. Location may be scaled from the drawings, and slip them over the spars, align and cement.

Remember that the innermost rib on either side is made of 1/8" sheet balsa. This rib must be cracked at a point 1/4" aft of the rear spar and each spread out to allow room for rudder adjustment. Leave a space of 1/32" between these inner ribs and the fuselage. Do not cement these ribs to the fuselage. This is important because if breakage should occur, the stabilizer may be removed by merely reaching between the inner ribs and the fuselage and cutting the spars. This will save tearing out the side end plates at this section and considerable work in replacing them. When spars have been cut it is a simple matter to drill out the dowels and the holes are ready for new assembly.

Balsa leading and trailing edges to the third rib should be assembled next as shown in the drawings. Use 1/16" sheet balsa for these parts. Cut the pieces to fit the ribs as you did the trailing edge of the wing. The rest of the stabilizer outline is 3/64" square bamboo cemented and tissue wrapped as described before.

Lay out the propeller blank from the drawings printed in half size. The block itself is of hard balsa 9" long, 1 1/4" wide and 5/8" deep. The face or front of the propeller is that side which tapers from the hub as shown in the side view prop drawing. Carve in the usual manner. The blades at their widest part should be 1/8" thick tapering to 1/16" at the tips. Camber at the widest part should be 1/16" deep. Balance the propeller carefully.

The prop shaft is shown full size in the drawings. However, bend only the rubber hook at this time. Slip over it a piece of radio tubing to prevent cutting the rubber. Put the shaft into the bearing from inside the fuselage.

Cut a piece of sheet brass as wide as the hub and 1/2" long. This is drilled and cemented to the back of the hub to form a bearing surface and protect the propeller. Now slip on the prop, bend the end to a U shape as shown and press the prong into a previously drilled hole. Put a small sheet of brass under this U hook to prevent it from pulling through.

Cement these parts well and line up the prop until it runs perfectly true. The spinner is made of medium balsa, carved

AIRPLANES · MOTORS · SPEEDBOATS

"Designed to Perform"
BY BUNCH ENGINEERING STAFF

SCORPION GAS MODELS



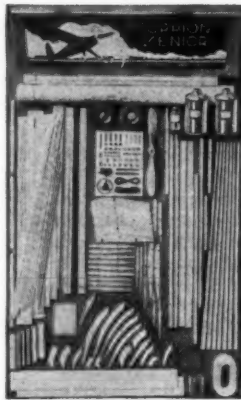
Wing span 57"
Length 41"
Weight 3 lbs.

Amazing performance of Scorpion Senior and Scorpion Major attested by thousands of flights.

✓ Check these features:

- Full-sized illustrated plans.
- 3½" standard pneumatic wheels.
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- "Autoknips" timer and all fittings.
- Finished and varnished propeller.
- Cut balsa wing and tail ribs and tips.
- Ready-bent music wire landing gear.
- Shaped, tapered wing spars and edges.
- Grade "A" selected hard balsa.
- Semi-shaped nose cowl.

Master Kit (as pictured).....\$10.50
Standard Kit (less only timer, wiring,
propeller, shaped cowl).....\$6.95
Special Kit (less chemicals).....\$4.95



Order Senior for Inverted motor.
Order Major for Upright motor.
Plans, Instructions only.....50c

PARAMOUNT in the mind of each Bunch model engineer is the desire to create models of increasing and better performance. This propelling desire is invariably reflected in every Bunch achievement.

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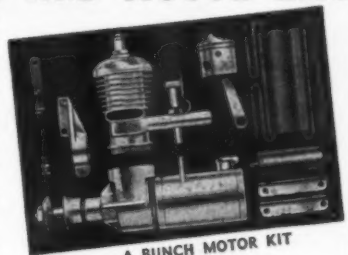
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For airplanes or boats, these piston ring equipped motors are the world's most powerful, light-weight model engines for their displacement.

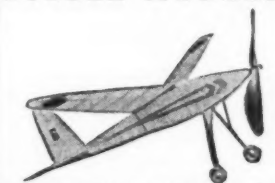
The **Gwin-Aero**, **Mighty-Midget** and **Mighty Marine** Kits, with instructions and mounting skids, assemble easily and require no special tools. Get power and performance for your money.

Specifications for all Bunch Motors: Bore, 7/8"; stroke, 13/16"; bare wt., 6½ oz.; 1/5 h.p. at 5200 R.P.M.; ¼ h.p. at 8500.



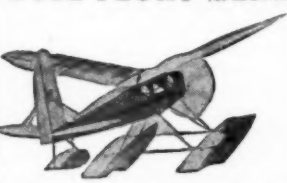
A BUNCH MOTOR KIT

RUBBER MODELS



Cadet Major—30-inch duration model. Fuselage design controls slip-stream. Kit, complete with rubber tube, carved prop, and freewheeler, postpaid **\$1.50**
Cadet Junior—20-inch wing. Rubber tube, carved prop, balsa wheels, freewheeler. Price, plus 10c postage.....**50c**
Special—Both kits, Cadet Major and Cadet Junior, postpaid.....**\$2.00**
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GULL FLOAT GEAR



Equip your present ship with the **Bunch Gull Float Gear**. Any 3- to 6-lb. gas model easily operated over lakes or bays. Balsa construction, fabric covered. Weight, 12 oz.

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Plans and full instructions only, postpaid.....**25c**

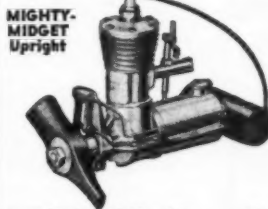
SEA HORNET SPEEDBOAT



The **Sea Hornet** is the most thoroughly worked out, gas-powered speedboat kit today. Balsa construction, 24" long, 9" beam, speed 20 M.P.H. Comprehensive instructions and 20 step-by-step drawings make construction simple.

Master Kit—Complete with full-size drawings; ready-cut frames, sheer planks, motor mount beams, keel, knee, stem pieces; threaded drive shaft, coupling, rear strut, propeller, driving dog and stuffing box. Includes cement, dope, fabric and every part to build as illustrated.

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Plans and Instructions only.....**50c**



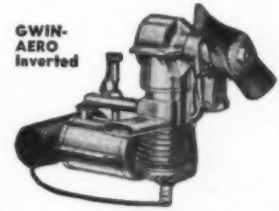
Assembled . \$14.00 — Kit . \$9.85



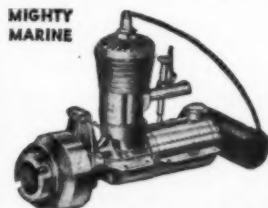
Assembled . \$17.50 — Kit . \$11.35



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The new . . .
WARRIOR

Today's greatest motor value. Assembled, mounted and tested, only

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The kits contain absolutely
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opening door, super-detailed
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15 3/4", Kit D-32 complete
(Except NO LIQUIDS) P.P.
Only 65c.

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A new and revolution-
ary gas model at
starting low
price correct in
aerodynamic de-
sign and perfect
in structure.

Kit is complete
with all items
needed, including
full size plans and
instructions for
building and flying
ready made Balsa
r.b.a. stamped
metal cowling, etc.
Balsa strips cut to size, metal fittings, etc. \$4.95 postpaid
—less motor and wheels.
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The Ideal Model Boat En-
gine. Air-cooled and effi-
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Easily adjusted. Capable
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complete with flywheel.
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Each

1/16x1/16 .05

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1/16x3/4 .05

1/16x1 .05

1/16x1 1/4 .05

1/16x1 1/2 .05

1/16x1 3/4 .05

1/16x2 .05

1/16x2 1/2 .05

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1/16x5 1/2 .05

1/16x5 3/4 .05

1/16x6 .05

1/16x6 1/2 .05

1/16x6 3/4 .05

1/16x7 .05

1/16x7 1/2 .05

1/16x7 3/4 .05

1/16x8 .05

1/16x8 1/2 .05

1/16x8 3/4 .05

1/16x9 .05

1/16x9 1/2 .05

1/16x9 3/4 .05

1/16x10 .05

1/16x10 1/2 .05

1/16x10 3/4 .05

1/16x11 .05

1/16x11 1/2 .05

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1/16x12 .05

1/16x12 1/2 .05

1/16x12 3/4 .05



BOOLETT'S G-3



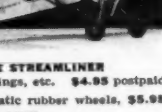
BOEING P-26 PURSUIT



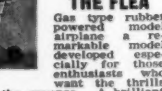
BISHOP'S NIEUPORT



THE STREAMLINER



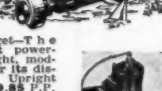
THE FLEA



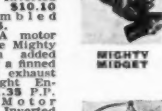
MIGHTY MIDGET



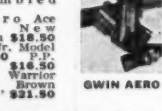
GWIN AERO



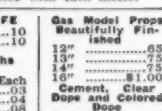
MIGHTY MIDGET



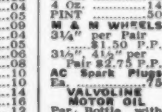
GWIN AERO



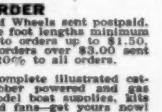
MIGHTY MIDGET



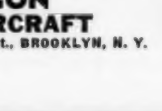
GWIN AERO



MIGHTY MIDGET



GWIN AERO



MIGHTY MIDGET

from a block 1 1/4" square and 1 1/2" long.
If a lathe is available turn the spinner.
Slot the back of it carefully so it will slip
over the propeller hub, cement it securely
in place and true it up before the cement
dries. The spinner should spin without
wobble. This spinner not only improves the
model's appearance, but provides an ex-
cellent cushion for a nose in landing which
might, but we hope not, happen.

Before covering the model TP-6, set in
the rudder, put on the wing and make a
final alignment check. Correct any distor-
tions by steaming the parts at fault.

Cover the fuselage first using a good
grade medium weight tissue. Colored tissue
or paper of that weight may be used, but
is liable to split when heavily doped and
has little strength on this model. Paper
the sides and bottom, but leave section
A-B on the bottom open to get at the
motor.

Water the fuselage covering and when
dry give it three coats of straight dope all
around, sanding all wood parts (nose block,
prop, sheet top) between each coat. Cover
stabilizer and rudder next, spray with
water and give these members two coats
of the fuselage dope cut with an equal part
of thinner or acetone. The wing should be
watered first, then doped with three coats
of the 50-50 mixture. Dope the propeller
and spinner once again.

This model should be colored with a good
grade of lacquer cut 50 per cent with
thinner. If possible spray it; however a
good brushing job can be obtained with
care. Two coats of lacquer will suffice.

Wood parts being lacquered should be
sanded lightly between coats. The color
scheme on the original TP-6 was simple,
yet attractive. Fuselage, rudder and spinner
were red; wing, stabilizer and propeller
were canary yellow; wheels were silver
with black tires and yellow hubs. Put on
the celluloid windshield and balsa headrest,
shaped to your own fancy but do not cut
out a cockpit.

The motor power needed in the TP-6
will depend on the performance desired.
The writer uses 14 strands of 3/16" flat
rubber for normal flights, and up to 18
strands for super action flights. The fuse-
lage is stressed for 24 strands of this
rubber. Make a rear hook as shown in the
drawings, cover with radio tubing and
string up a 14 strand motor for a beginner.

The rubber hook, you will notice, is of
odd shape, but is designed so that you can
handle it with the winder hook alone.

Make 4 small "S" hooks for each lower
point of the wing saddles and attach the
wing using three heavy flat rubber bands
for each saddle. Even up their tension to
keep the wing straight.

Set the rudder in neutral position, install
the motor, tie a rubber band around each
end near the hook to keep it from slipping
off the hook, and test the ship for balance.
Lift it from the ground by placing a finger
under each wing tip. The model should
hang very slightly nose down.

Glide test your TP-6 before winding it.
It will take a pretty good heave to get it
going. When your adjustments are right,
the TP-6 will climb slightly, hold on and
land perfectly after a long, straight, flat
glide.

When the correct adjustment is obtained,

wind the motor with a winder until a double
row of knots appears, hand-launch TP-6
in a steep climb and watch it go. The model
will take hold, climb steeply to 75 or 100
feet, and what happens after that will be
a thrill for you builders to enjoy.

Launch and fly this model only in an
open space free of obstructions, a space
with a smooth landing place. An area 300
feet square is recommended. Take care
that no other models are in the air around
you.

Normal flying speed is 45 to 50 m.p.h.
so do not fly this model near crowds. One
of its thrilling maneuvers is a steep dive
at around 65 m.p.h. after which it will
zoom sky high and glide like a gas job.
Try different rudder settings for varied
flights.

This transition model has given you ex-
cellent schooling in construction which
will be of great help to you when you
build your first gas job. It will also give
you many hours of snappy flights and per-
fect landings.

Now that you have studied this text and
drawings as advised in the beginning, put
your ship together and enjoy the fruits
of careful workmanship. Good building!

Frontiers of Aviation

(Continued from page 13)

Glenn L. Martin's Model 156 which just
passed test flights for the Russian govern-
ment has a larger wingspread than the
Boeing "314" seaplanes now nearing com-
pletion. Its range is such that it would
be able to cross the Atlantic non-stop.
Russia will play safe though and have it
shipped over. And then, for awhile, even
the U.S.S.R. will have a larger commer-
cial flying boat than we will have. Never-
theless we hope we will export many more
big boats like that, for it certainly helps
the financial status of the aviation in-
dustry. The main changes made in the
Martin 156 from the China Clipper are
that wing flaps are employed, wing sec-
tion changed from Gottingen to the
N.A.C.A. 23,000 series, aspect ratio en-
larged and a double-rudder tail.

Col. Lindbergh's recent visit to this
country was to supervise the bidding on
large 100 passenger flying boats that Pan
American will order in the near future.
Invitations were sent out to seven manu-
facturers to submit plans of flying boats
designed by them. Pan American will
look them over and then decide who will
get the orders. The airplanes must be
able to carry at least 100 passengers and a
crew of 16. Cruising speed must be at
least 200 m.p.h. with a payload capacity of
25,000 pounds and a cruising range of
5,000 miles. The mail, baggage and ex-
press compartments must be large enough
to hold extra cargo in case the full sup-
plement of passengers is not carried. The
airplanes must be able to operate effi-
ciently at 20,000 feet with interior cabin
pressures equivalent to 8,000 feet altitude
made possible by pumping oxygen into the
hull.

Prices were asked for lots of three, six
and twelve airliners. The seven com-
panies that will try for the business are
Boeing, Glenn L. Martin, Consolidated,
Curtiss-Wright, Sikorsky, North Ameri-

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Robert Chamberlain



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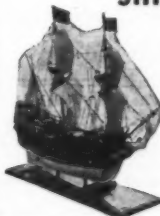
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propeller will be leaving the ground as this is read, for its first aerial jaunt.

Bennett Aircraft Corporation's new airplane has been completed after enjoying much privacy in Hawley Bowlus' back yard for these many months. The plane has been built in Bowlus' small shack where he builds trailers and those famous sailplanes. Designed by Vance Breese the new plane is built entirely of wood with no nails employed whatsoever. All connections are joined with glue throughout! The retractable landing gear and engine mounts are the only metal structures. Generally, the ship is a twin-engined mid-wing that will invade the sport and commercial markets at a low price.

Another job just off the line is Harry Crosby's racer that was rushed to completion so that it might be ready for the New Orleans Races.

Howard Hughes' consulting staff has been working on the redesign of the Driggs Skylark which is now known as the Western Pirate. Many parts of the Skylark were built before the depression but never were assembled. Now a company has been formed to assemble the parts and also modernize the plane. The ship is powered by a 95 hp. Menasco engine and is an enclosed biplane selling for about \$2,500. Wing span is 28 feet and cruising range is 450 miles at 108 m.p.h.

The latest rumor about Howard Hughes which we will tell you in the advent that it might be true, is that he is associated with the PJC-1 sportplane. He has flown the airplane a few times.

Something unique is the single-engine pusher airplane developed and test flown by the Abrams Aircraft Corp. It is a mid-wing airplane with its tail on outriggers. A radial engine is just aft of the long, slender fuselage that projects out to some extent in front of the wing and houses a nose wheel. The front of the fuselage somewhat resembles the gun turrets on our present bombers, being glass enclosed. The Abrams' ship has been designed and built especially for photographic work and we hope to bring you more details of it in the very near future.

Howard Hughes' world land-plane speed record was literally smashed to bits when Dr. Wurster, chief pilot of the Bavarian Airplane Works, bounced a new Messerschmitt Bf-113 converted low-wing, single-seat German fighter to a new world mark. Doing most of the work was the Mercedes-Benz DB 600 engine normally producing 950 hp. but perhaps "suped up" for the speed dashes. The speed attained was 379.66 m.p.h. compared with Howard Hughes' record of 352.388 m.p.h.

We have not seen the actual plane that broke the record as yet, but we do know very much about the standard Messerschmitt Bf-109 of which great quantities have already been built for the German air force and pictures of which appear on pages 12 and 13. So here goes with a description, but we must admit we do not know how they obtained 379 m.p.h. out of such a plane unless a vacuum prevailed over Germany on that day. The plane however is a splendid looking job, though perhaps not as racy in appearance as

Heinkel's new pursuit. In general it is a low-wing, full cantilever, single-place, enclosed monoplane. Beginning with the nose we see a Hedderheimer adjustable propeller, a new German product. Its spinner is well shaped but does not conform with the shape of the fuselage, the nose bulging abruptly at the rear of the spinner. There is a hole in the front of the spinner to let out the shells from an aircraft cannon that shoots straight through the crankcase of the engine. Without that opening, pray tell what would happen inside the engine. Perhaps air is also taken in for cooling the engine though there is a somewhat large radiator well faired into the bottom of the fuselage, its opening being almost under the center of the engine. Inverted and of v-12 design, the engine permits the incorporation of a circular nose that offers the best streamlining. Further aft is the wing which is very well tapered but whose tips are more of the "chopped off" type. The reason for this, though not offering the very best in streamlining, is that slots are used out on the leading edge of the wing and the large area at the tips prevent the high wing loaded ship from "falling off" on one wing when the pilot stalls it for a landing. The slots maintain a layer of air close to the upper surface of the wing and that dangerous stalling point which always begins at the wing tips is eliminated. There appears to be plenty of wing area so the wing loading cannot be too high. The trailing edge is divided about half-in-half between flap and aileron. The flaps are of the plain type, the whole portion of the trailing edge dropping down. Landing speed is about 56 m.p.h.

The pilot enclosure is spacious with good visibility, and it appears that the pilot could stay cooped up in there for sometime before suffocation took place. Forward vision however is not what it should be. The fuselage aft is oval shaped and fairs very neatly. The tail though is not what one would expect to find on an airplane that held the world land-plane speed record. It is single-strut braced!

The landing gear appears to be a work of art with its very thin, single, shock struts protruding from the leading edge of the wing. The wheels retract outward and aft into the wing, going completely out of sight. If the pilot cannot hit his enemy with the cannon he can try to finish him off with two fixed machine-guns shooting through the propeller. Under ordinary conditions the fighter is said to do about 335 m.p.h. full out. The metal skin covering is very smooth without a rivet showing. But where does all the speed come from? We can offer only the following guesses: the smooth metal covering, light weight, perhaps small amount of armament, small range, v-type engine, super-charging, use of ether in the gas, or a careful study of the propeller torque flow around the plane. We must take our hats off to Dr. Wurster for his excellent performance.

A version of the twin-engined Beechcraft is now offered for export equipped as a light bomber with bombs and machine-guns.

can and Douglas. We will take Sikorsky as a "long shot."

In a section of the factory just next door to the Lockheed plant is a newly formed aircraft company that has been operating for sometime in secrecy. This concern, which we think is named Airover, is said to be associated with Lockheed. One of its officials is Mac Short whose name has long been associated with the design of Stearman airplanes. The new company is expected to bring back into being the manufacture of the old Lockheed designs such as the Orion and Vega with modern improvements. They are also working on the design of an airplane with a tricycle landing gear in which all three wheels will be retractable. Two Menasco Super-Buccaneer engines are now being fitted in the nose of a Lockheed Altair. They will be geared together and will turn one propeller! Test flights on the plane should be conducted in the near future according to information that we have been able to obtain.

The Lockheed Aircraft Corp., itself has been working on tricycle landing gears, and who knows, their Model 16 may come out with such an undercarriage.

In the meantime Allan Lockheed's new creation with its two menascos placed side-by-side and each turning its own

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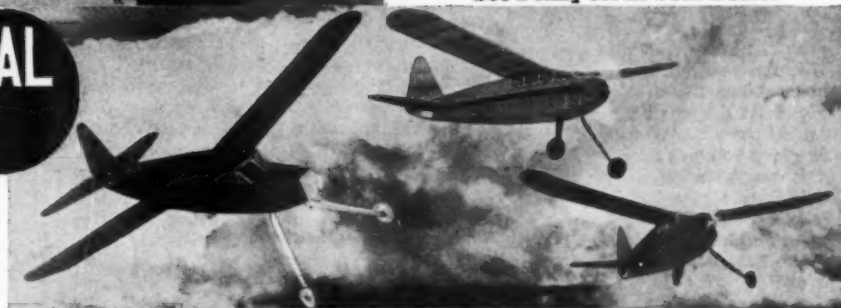
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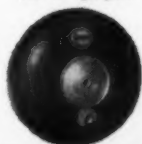
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Useful load—1918 lb.

Gross weight—5952 lb.

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Cruising speed—270 m.p.h.

Landing speed—65 m.p.h.

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Service ceiling—30,000 ft.

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How to Build the Mayo Composite Aircraft

You have to hand it to England for thinking of such a contraption and for actually going ahead and completing the real thing—the Mayo Composite Aircraft we mean. The idea is that the lower plane will lift the small heavily loaded upper component into the air and then drop away and let the small job go under its own small power. Referring to the table on the plans you will see why the experiment is worth trying. Note the 35 lb. wing loading of the "Mercury."

Well this is the 47th jolly little gathering of our whittlers' club. You whittlers that have been whittling out the other 46 ships of this series did not know you belonged to a club, did you? We didn't either until we thought we'd better stir up some life among the replica model builders as building models of solid wood is still a splendid pastime, and you have something worthwhile when you get through—that is, sometimes. Much depends on who is building the model, but if you are careful and practical you should have no trouble as building balsa models is comparatively easy. If and

when you complete a model send us a picture of it as we would like to hear of your activities.

We suggest that the beginner better start on a model in one of the back issues as the models this month are a little more difficult than usual. It is best to build one model at a time though the following instructions will pertain to both models.

The entire models are to be made of balsa wood which may be purchased from any model airplane supply company listed in this magazine. Draw the outlines of the various parts of the model such as wing, hull, tail, etc., as shown by top view of plans and cut to shape with a jig-saw. Be sure the grain of the wood is running lengthwise.

In the case of the "Maia" draw the outline of the side view of the hull on stock and on the fuselage and floats of the "Mercury" do the same and cut. Shave down all parts as shown by the various cross-sections with a small, sharp and flat chisel or razor blade. Cut notches in the leading edge of the wing with a razor blade in order to fit the engine nacelles which will be put on when the model is assembled. In making the three-bladed propellers it is best to make each blade separately and then join them to a central hub with model cement.

Look over the plans and check to see if you have made every part. Then go over all the pieces with coarse and then fine sandpaper until their surfaces are very smooth. Begin the assembly next. Lay the hull or fuselage in flying position on a flat level surface with props under it to hold it in place and join the wing panels to it with plenty of model cement. Be very accurate and put on each piece with care. Apply a sufficient amount of model cement to make joints hold firmly. The accompanying plans will show clearly how the models are to be assembled. Small straight pins may be used as propeller shafts. Use putty or plastic wood for filleting.

When all joints have dried go over the

entire model with fine sandpaper again. Brush off all dirt and begin the paint job. Both models are to be painted white with black trimmings and lettering. Many coats will have to be applied before a smooth surface is obtained. Wait for the first coat to dry before applying a second. It is best to purchase a quick-drying lacquer or dope.

After several coats have been applied the models will be completed. Place the "Mercury" on top of the "Maia" as shown by the three-view drawing and apply cement to the joints. Or if you wish to have the "Mercury" removable, inject small pieces of wire into the struts of the "Maia" structure and drill small holes in the bottom of the "Mercury" fuselage and floats where they will pierce. The models will then be completed.

Your Career as an Aeronautical Draftsman

(Continued from page 7)

drawings be made in pencil without recourse of having a tracer do the final work. Tracers are employed less and less in industry because as a working component to the modern engineering office they are simply a source of overhead cost. Tracers are usually versed only in drawing. These men may be also apprentices who are not as yet entrusted with actual design and detail work.

The conventional drafting room employs large groups of detailers. These men in reality are skilled engineers although not necessarily having a collegiate engineering degree. They comprise in many cases practical persons who have acquired their experience by schooling, home study or practical experience. Detail work as it is now undertaken requires a specialist in the design of some small integral part. The whole structure of the airplane is broken up into small components and each part is worked up by a man or group of men who specialize purely in this phase of the work.

The type of drawing is something that is a matter of specialization. A good detailer should have a fluent knowledge of the following:

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- (1) Projection drawing.
- (2) Perspective.
- (3) Isometric projection.
- (4) Freehand.
- (5) Plain mechanical drawing.
- (6) Geometrical drawing.

Each subject is used in drawing of parts for aircraft from time to time. This involves the design and full size layout of component parts on a hardware floor or marble slab. This full size detailing is becoming more and more widely employed.

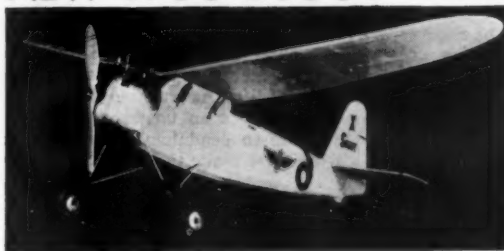
An expert detailer in the profession of the average aircraft concern should be familiar with the following subjects:

- (1) Machine part design.
 - (2) Economics and characteristics of raw materials.
 - (3) Stress analysis. Strength of materials.
 - (4) S.A.E. and A.S.M.E. standards.
 - (5) Tool and jig design.
 - (6) Manufacturing costs and shop operation.
 - (7) Aircraft accessories and installation.
 - (8) Government military requirements.
 - (9) Airline requirements. Servicing, etc.
 - (10) Aerodynamics and theory of flight.
- Upon inspection the list is rather pretentious. However, to the prospective draftsman, the above list will initiate the novice into what may be expected of him.

Perhaps one of the most fundamental factors in airplane drafting is the necessity for the cultivation of a good distinctive style yet conforming to the requirements of the concern where the individual is employed. Distinctive styling may be achieved by certain use and tones of lines, blocking out of the work, layout and lettering. Lettering is a very important adjunct to good appearance. Poor lettering ruins a good drawing while a poorly executed detail may be improved by good lettering. Many engineers are invariably poor letterers. This often is the indicating point to the chief in charge of the lack of the inherent ability of the particular individual. Such little details point out to others whether the individual is of the ordinary or just average which isn't very much, or beyond average.

Now to the tyro student who intends to follow engineering through the drawing room, may it be said that he can prepare himself beforehand by practicing and making drawings. Purchase the leading textbooks and see how they pursue the work and try and follow suit. Valuable experience and practice can be attained by home practice. This will make you drafting conscious and in the end you will be in a better position to secure a start in the drawing room. Good drawings are like a picture. They are the equivalent of 10,000 words. It may be suggested that MODEL AIRPLANE NEWS prints three view drawings which are ideal subjects for tracing purposes. It is also to be mentioned that the class of drawings shown in this magazine from time to time represent a class of work which is distinctive and attractive. If you as an individual can match this class of work, then you can be assured of securing a toehold in the drawing profession.

MODEL CRAFT Announces NEW 1938 SCOUT FOR MIDGETS, DENNYMITE CYCLONE, OHLSSON OR BROWN



New 60 inch tapered Clark Y wing, new landing gear, new cowl. Kit contains formed landing gear, cut-out ribs, formed face plate and sheet for cowl, switch, hook-up wire, cement, dope, silk, full-sized plans and \$7.25 prepaid in U.S.A.

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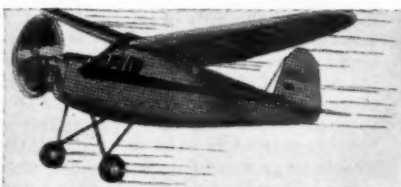
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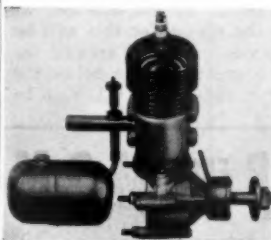
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Designing Your Gas Model

(Continued from page 11)

be in the position in the diagram unless you take decided steps to insure its position at this point in the finished model. In the case of the Stinson, it will be necessary to place the batteries very high in the fuselage, in fact, right up against its top within the cabin. Do not let the desire to produce a low center of gravity tempt you to place the batteries low in such a ship. The point of design that is more important than a low center of gravity is the location of the C.G. on a horizontal line with the C.L.A. The batteries could not be placed in the bottom of the fuselage and still have this condition exist.

Now we come to the problem of a low wing. Model builders seldom attempt to build this type of ship because of its unstable characteristics compared with high wing or parasol airplanes. Actually it is very much less stable than the two latter types. However, some consideration should be given to it inasmuch as the low-wing gas model often serves as an interesting experiment.

When building such a ship, naturally it is desired to make it as stable as possible. This may be done by following the procedure outlined here, that is, first establish the C.L.A. and then the C.G., in their proper positions relative to each other. Next you may draw in the line of thrust. In most low-wing airplanes the line of thrust will pass above the C.G., which is a favorable condition. However, the model designer's problem will lie principally in establishing the correct point for the C.L.A. In low-wing airplanes not only the side elevation of the body contributes to the lateral area, but the side elevation of the wing also contributes to it. In figure (H) the wing side elevation blankets part of the side elevation. Therefore the C.L.A. of the silhouette would be slightly high. Approximately, the C.L.A. will be in its proper position if its position is determined with the fin cut off above the horizontal line passing through its intersection with the top of the fuselage. In many cases this line is the top of the fuselage. In other words, draw your silhouette, cut off the upper part of the fin as described and proceed to balance

the cardboard pattern in order to determine the C.L.A.

In Diagram (H) you will see the side elevation of a North American observation attack airplane. The C.L.A., the C.G., and the line of thrust are shown in their correct positions. The one characteristic which is observed in the case of this ship is that the center of gravity must be above the center of lift. As most model builders know this causes an unstable condition, the opposite to pendulum action. Often model builders make the mistake of lowering the center of gravity to a point which is on a horizontal line with the center of lift. This is fine if this condition is all that must be considered. However, it is obvious immediately that the center of gravity under these conditions is far below the C.L.A. Model fliers have often wondered why low wings bank to an extreme degree. Usually they attribute this characteristic to propeller torque. They are partly right, but the chief fault lies in the fact that the center of lateral area is too far above the center of gravity. This condition produces extreme banking on turns and spiral instability. Matters may be helped measurably by making the wheels fairly large and filling in the space between the landing gear struts. On non-scale models the fin may be extended down below the body of the fuselage with very little of it existing above the fuselage. These two modifications tend to lower the C.L.A. Consequently the center of gravity may be lower when these features are used. A good rule to follow in low wing types is keep the fin low, the wheels large and fill in the landing gear struts. Then the C.G. may be placed low.

At the present time a great deal of interest is being shown in hydro gas models. Considerable success has come to many builders of this type of craft. In fact some have remarked how well this type of ship has flown when they have attempted to build it for the first time. There is a very good reason for this. Whereas in the majority of gas models the center of lateral area is too high, this is lowered to a great extent as soon as pontoons are added to the plane. If you will look at Diagram (I), the reason for this will be obvious. The side or lateral area of the pontoons are a great distance below the body of the ship, causing the C.L.A. to be

located at a point far below that which is usual in a land plane. Thus if the C.L.A. in a land plane design is too high, the addition of pontoons will lower it to a more helpful position. In the figure, you will note its position relative to the outline of the ship. Whereas the line of thrust in the figure is above the center of gravity it would be below the center of gravity if this plane were a land model, for the C.G. would be much higher in the latter case than is shown. Thus, types of airplanes in which the line of thrust is low relative to the structure of the fuselage may be used as hydros, whereas they are poor as land planes, if the greatest degree of stability is desired. Hydros for this reason offer a greater latitude of design than land planes.

Now that we know something of the character of the models that are most adaptable to the best force arrangements and why, the type of model which will possess the greatest stability and efficiency may be selected as the basis of your gas model design. You should not allow the looks of a particular type of model to influence you in your selection at the cost of stability and efficiency. In this case, appearance must be held secondary if it conflicts in any way with these more important factors.

In choosing the type of model for your purpose, one must be selected which will embody the stability force arrangement described in the previous article or a slight modification of it. Variations of this force arrangement are shown in Figure No. 134. Various types of models are shown all of which will have a stable force setup. Diagram (A) shows a plane which is designed around the most stable force arrangement. The force arrangement pictured in Diagram (D) is a very close second in respect to stability, the only difference being that the line of thrust in Diagram (D) is slightly lower and closer to the center of gravity than in Diagram (A). The outlines of the planes shown in the other diagrams need not be considered as each one is inferior to the planes shown in diagram (A) or (D). Plane (D) has some advantages which plane (A) does not possess though plane (A) may be more stable.

First of all, the stabilizer of plane (D) may be set at a more positive angle than would be possible in the case of plane (A). This is due to the fact that the line of thrust is lower in plane (D) than in plane (A). Because of this a greater climbing or stalling moment is induced in this ship. This, of course, will tend to nose up the ship and cause the tail to drop. To compensate for this, the stabilizer is set at a slightly more positive angle than the situation would demand in plane (A). Thus, the tail has a greater lifting effect and gives the plane more buoyancy and climbing ability.

Second, due to the lowering of the line of thrust, a body or fuselage may be used which has a more perfect streamline outline than that shown in plane (A). Thus plane (D) will offer less resistance to forward flight than plane (A). Plane (D) is extremely stable though not quite so much as plane (A). After all, all that is necessary is that there exists sufficient stability.

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Thus it is advisable because of added efficiency and the possibility for better performance that we select plane (D) as the model to design.

If you have followed through the analysis undertaken in the preceding articles, you will have made a layout of the force arrangement around which type (D) has been drawn. If not, lay out the force arrangement in Diagram (D) on your drawing board and draw in the side view with the outline shown.

The next step in the process of design is to determine the size that your model should be. In your diagram the distances from the C.G. to the center of the stabilizer (indicated by the vertical line passing through the tail) has been taken as 12 inches for the sake of convenience, and in order to establish the relative positions of the center of lift (C.L.A.) etc. In your drawing you should make this distance "M" equal to 12 inches. Normally, the size of a model is determined by the span of its wings, therefore, the first step in laying out the model's general proportions is to decide upon this factor. Usually a ship is designed around some particular model engine. The wings should not be so large that the plane when finished will be too heavy for the engine which is to pull it, nor so small that the motor will be too powerful for the plane and drive it at tremendous speed. However, it is

not necessary to determine the exact span of the wings at this point in our procedure. All that is necessary is that the proportions of the plane and the relative position of the parts are established.

The moment arm having been taken as 12 inches, we may decide upon the value of the wing span relative to the moment arm. Obviously, when all proportions have been determined the measurements will be very much too small for a gas model. However, it is a simple matter to increase the scale of the drawing to any size which will be appropriate for the motor which is to power the ship. In rubber-powered models the general rule which establishes the relationship between wing span and moment arm is "make the wing span twice the moment arm." However, gas models may be built with a much smaller moment arm without infringing upon its stability. It is a distinct advantage to make the fuselage as small as possible relative to the wings, for in this way the total weight of a model may be reduced relative to the wing area. Inasmuch as contest requirements specify that the cross-section of the fuselage should be equal to $L^2/100$, where L is the total length of the plane, it is obvious that the shorter the plane the smaller the cross-section of the body may be made. A good rule for the relationship between the moment arm and the wing span in the case of a gas model is "make the moment arm 40% of the wing span." Another rule is "make the moment arm three times the average chord of the wing." Probably the latter rule will best serve your purpose. If the average chord rule is followed, the value of the chord will be $1/3$ of 12 inches, or 4 inches on your drawing.

If you should choose to follow the rule which specifies the value of span relative to the moment arm the span would be $10/4$ ths of 12 inches, which is 30 inches. Now, if the span is 30 inches and the chord 4 inches, the wing will have an aspect ratio of $7\frac{1}{2}$. This is an excellent value for efficiency. However, greater efficiency may be obtained by making your wing of the tapered type rather than with uniform chord. A taper is suggested which will be provided by a chord of 5 inches at the center section and 4 inches at the tips. In such a case, the tips should be made elliptical. A wing of this type will fulfill every qualification of efficiency.

How to Make a Direct Reading Indoor Scale

(Continued from page 17)

India ink and place the .01 oz. weight on the platform. The arm should swing out to approximately the same distance as shown on our plan and cease moving in a few seconds. Make sure that the pin is moving freely without rubbing on the paper and put the .01 mark right in line with the pin. Now you will be able to make another .01 weight out of modeling clay. This is divided into two exact halves by trial balance each giving you a half of .01 or .005 oz. One of these sections divided into five even lines, each showing a .001 oz. finishes the first section. And so by repeating this procedure you can calibrate as many sections as the swing of the

scale arm allows.

In case the position of the scale is changed and the pin will not go back to the starting point, you will probably find some little thing under the base tilting the stationary part off perpendicular.

N. A. A. Jr. News

(Continued from page 23)

activity in this state is being divided into sections of approximately equal size and each section will be headed by an active model worker. This method of division should certainly add to the cooperation of all groups and make for great progress in model aviation. We salute you, New Jersey, for a very excellent idea.

Al Lewis of the Junior Aviation League has sent in an outline of all the meets this group plans to hold within the League. Al wrote to N.A.A. headquarters as follows: "These contests are all in addition to the League's regular weekly meetings, trips to the airport, and movie parties. The League's budget has just been passed for 1938 and the Armory has been hired." They really do things up right in that group and are certainly starting the new year off with a bang.

In a recent inter-club contest of the Junior Aviation League, Hewitt Phillips, Senior division, in the indoor Class C hand-launched stick model event took first place. Phillips also took first place in the Class B Stick R.O.G. event. Willis Brown, Open Class, took first with his Helicopter, to set a new Boston record. Time: 1 minute and 1 second.

In a Quaker City Gas Model Ass'n. inter-club meet, Joseph Kapral took first place. According to reports from William Berry, they're getting thermals almost as strong as they were in mid-summer. As you might assume from that, they are going strong and expect to break some records most any time now.

Boston and Chicago Contests Scheduled for January and February, 1938

The Junior Aviation League plan to hold N.A.A. sanctioned contests on the following dates: January 8, January 22, February 5, and February 19. These contests will be held at South Armory, Irvington Street, Boston, under the direction of Albert L. Lewis, Gunnar Munnick and Willis C. Brown. In all these inter-club contests, the entrants win points. Those obtaining the most points will receive a trip to the 1938 National Model Meet. That certainly is something to work for and the members of this League are going in for it in a big way. Who wouldn't?

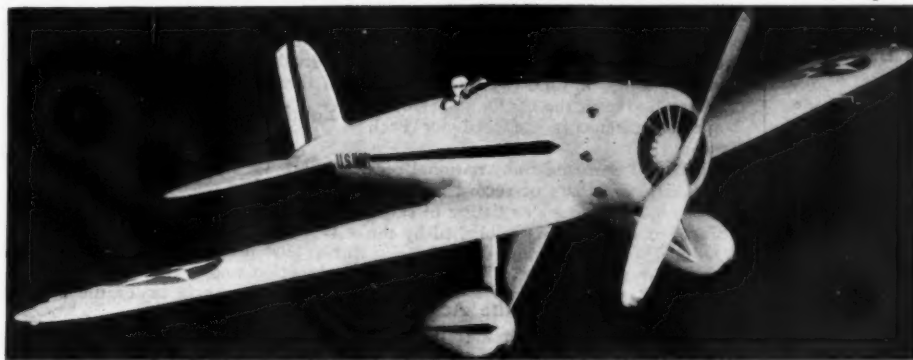
February sixth will see an N.A.A. sanctioned model meet being held at Kosciuszko Park and Logan Theatre. This meet will feature Indoor R.O.G. Class A models, Indoor Class A Gliders and Exhibition Scale Models. Prizes will take the form of a trophy, theatre tickets, merchandise certificates, and airplane kits. Bernard S. Schwartz 3451 Ainslie Street, Chicago, will direct. In case any of you are interested, you might drop him a line.

State of Connecticut Will Lift Ban on Gas Flying and Try N.A.A. Program

Charles L. Morris, Commissioner of

THE WORLD'S FINEST MODEL AIRCRAFT

NEW LOCKHEED P23 A NAVY FIGHTER (Combination Land and Seaplane Set)



32" Span. Length 20 1/2". Weight 3 1/2 oz. 3/4" Scale. Color Grey

Model ready built as shown \$20.00

New sensational engineering triumph. A powerful looking ship and only combination land and seaplane model set on the market. Model will rise from land or water in a few feet. The construction set is most complete, containing 7 printed balsa sheets of fuselage and pontoon formers, wing ribs, tips, landing gears, etc., ready cut wheel pant cores, strong 2" aluminum wheels, axles, 3 3/4" turned balsa motor front, instrument board, colored wing and rudder insignia, Navy lettering, windshield, 9 special streamlined hollow metal exhaust pipes. A beautiful steel type 9" carved scale propeller. 3 oz. grey paint, 1 oz. paper cement, 1/2 oz. black, 2 oz. glue, 12 feet of rubber, motor, nose button with brass bearing, formed wire parts. A large 33" x 44" scale drawing of land and seaplane. Set in labeled Gift Box, postpaid. **\$295**

CURTISS HAWK 75



Span 37". Set \$3.25 P. P.

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Span 28". Set \$4.50 P. P.

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Span 22 1/2". Set \$2.95 P. P.

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Span 41". Set \$4.95 P. P.

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Span 38". Set \$4.50 P. P.

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Span 62". Set \$18.00 P. P.

These models are exact scale flying models of the latest fighting planes. All sets contain all parts printed on balsa, steel type carved propellers, celluloid or aluminum

wheels. Sets F11C4 and F1B4 have celluloid motors and aluminum cowls. All sets have set of colored paints, glue, etc.

Contains large photos of the best looking scale models you have ever seen—gas models, motors, supplies

NEW 16-PAGE 1938 CATALOG. SEND 10c COIN

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83 Low Terrace, New Brighton, N. Y.

Make money orders payable at St. George, Staten Island, N. Y., P. O.

Aviation for the state of Connecticut, announced December seventeenth that steps were being taken to lift the ban on gas models and try out the N.A.A. gas model program. Commissioner Morris made the announcement at the second meeting of the Organizing Committee for National Aeronautic Coordination which took place at Hotel Roosevelt in New York, to adapt a draft national aviation program. This draft program will be presented to the new National Aviation Planning Conference as a basis for discussion. Important to gas model builders in the draft program adapted at the meeting was a recommendation calling for encouragement of gas model building and support by state and federal officials of the new N.A.A. program for supervision of this activity.

It was following discussion of this recommendation that Charles Morris made his announcement regarding Connecticut's plan. In making his announcement, Morris said that certain additional limitations would be put on gas flying in Connecticut, over and above those called for in the general plan. He stated that this was due to the fact that his state was much more thickly settled and built up than other sections. He pointed out that from the Connecticut point of view

there was obviously more need for limitation on gas model flying in the interests of safety than in many cities in the west and middle-west which were more lightly settled.

The principal additional restrictions which will be required by Connecticut include no flying of gas models within a two-mile radius of any commercial airport and no flying of gas models from any site in Connecticut without prior approval. No date has as yet been announced for lifting the ban in Connecticut. It is expected, however, that arrangements will be completed by the state Aeronautic Commission and the N.A.A. in the near future.

Details of Gas Model Licensing Program Announced

Gas Model Flyers who make the following pledge will be eligible for the new N.A.A. Gas Model Flyers License:

I make the following pledge as my contribution toward the establishment of a standard of operation of gas models which will fasten greater confidence in and support of gas model operation on the part of airport managers, air transport companies, private and military pilots, state and federal aeronautical services, and the

general public. I swear that I will abide by this pledge at all times and in case I do not and my gas model flyers license is thus revoked, I will deliver this license immediately to an N.A.A. Model Contest Director or return it to N.A.A. headquarters, DuPont Circle, Washington, D.C.

I hereby pledge and agree that:

Each time I fly a gas model I will act to control its flight range either by the use of a timer which will restrict the engine run to not more than 40 seconds or by limitation of its gas supply to not more than 1/16 ounces per pound of model weight.

That I will not fly a gas model on or near any airport or heavily populated area unless the take off site has been approved for gas model flying by an N.A.A. Model Contest Director, Airport Manager, Bureau of Air Commerce Inspector or State Aeronautical Inspector.

I will not fly any gas model which has not been registered with the N.A.A. or such registration applied for.

I hereby certify that I meet the official age qualifications for gas model flyers (16 years of age or over) and that I will not permit any person less than 16 years of age or any person who is not licensed as a gas model flyer to fly gas models owned

FLYING MODELS

12" Wing Span

Aerona
Carben Ace
Consolidated
Curtiss Pursuit
Douglas Observation
Fokker D-8
Hi Climber
Vultee V-1A
Kinner Sportster
Lockheed Vega
Monocoupe
Polish Fighter
Puss Moth

Each Kit Complete

Northrop Pursuit
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Taylor Cub
Boeing P-12-E
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Fokker D-7
Hell Diver
Sopwith Camel
Spad
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16" Wing Span

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Flying Vought
Ryan
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Each Kit Complete

Curtiss Falcon
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Aerona
English Puss Moth
Fokker D-8
Polish Fighter
Spad
Stearman
Great Lakes Trainer
Spartan
Hawk
Curtiss Hawk
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20" Wing Span
Stinson S.R.B-C
Endurance
Monocoupe 90-A
Aerona Low Wing
Taylor Cub
Cessna

Boeing P-26-A

Dry Kits—No Cement
Bellanca
Beechcraft
Hughes Northrop
Curtiss Robin
S.E.-5
Waco Custom

English Puss Moth

ALL OF THE ABOVE KITS.. 2 FOR 35¢
P.P. U.S.A.

Money With Order—No C.O.D.—Special Discount To Dealers

G. L. YOUNG

2405 2nd Ave. No.

Birmingham, Ala.

by me.

This pledge form was adopted at a special meeting of the officials of the International Gas Model Airplane Association, the Academy of Model Aeronautics, and the N.A.A. in Washington on November 13.

By action of this meeting the annual gas model license fee was set at \$1.00. Each licensee is enrolled as a gas model member of the new Gas Model Division of the N.A.A. These fees help to cover a portion of the cost of issuance of flying licenses, registration of each model, the lapel pin, and the various individual and club services obtained. They have been held as low as practical for the benefit of all builders and covers only a portion of the total expenses which must be incurred by the N.A.A. in carrying on this work.

As licensed gas model flyers you will be eligible for the following membership benefits:

1. The N.A.A. Gas Model Flyers license with which is combined the membership card signifying membership in the Gas Model Division of the N.A.A. As holder of the N.A.A. Gas Model Flyers license eligibility to fly from "approved" sites.
2. The N.A.A. wing emblem lapel pin.
3. Registration of each gas model airplane owned by the license holder. An official registration label identifying the plane and decalcomania N.A.A. identification emblems to be placed on each plane.
4. As holder of the N.A.A. Gas Model Flyers license eligibility for entrance in gas model contests sanctioned by the N.A.A. with the right of protest and appeal. Eligibility for award of N.A.A. city-wide Championship Certificates.
5. Upon proper application, official recog-

nition of any state, national, or international records established together with an engraved record certificate attesting to such records.

6. Upon proper completion of performance requirements and upon written application, the Gas Model Flyers Rating Certificate of the N.A.A. These rating certificates are issued only to those members who in officially timed flights are able to meet the minimum performance requirements specified for each rating.
7. Upon written request any national record lists, drawings of record breaking aircraft, model rules or listing of sanctioned model contests published by the Association during the year.

Al Lewis Named President, Ed Roberts Secretary of the Academy

Al Lewis of the Jordan Marsh Junior Aviation League has been named the new President of the Academy, Ed Roberts the new Secretary. Election of these outstanding model leaders to these important positions in the Academy was made by a special postal ballot of all members when Captain Willis Brown found that due to greater responsibilities at Jordan Marsh it would be necessary for him to resign as President of the Academy. Also, Ernest Walen, the former Secretary, due to the great expansion of his own business and the press of new work found that he must resign.

Both of these leaders have pledged strong support of the new officers. Retiring President, Brown, in announcing the necessity of his resignation in a letter to all Academy members said "It has been a real pleasure to have served as the Academy's first President. Not the least of this pleasure has been the splendid co-operation I have received from every Academy member and I wish at this time to express my personal thanks to every Academy member for his fine support."

The postal ballot to members and election of the new officials followed a special meeting held at Washington, November thirteenth, at which new membership and operating programs for the Academy were adapted. Under these programs the Academy will: 1. Decide membership on a selective basis, paralleling the membership policy of the Institute of the Aeronautical Sciences. 2. Foster scientific advancement in model aeronautics. 3. Provide guidance and direction of national model aeronautic affairs. 4. Sponsor the First Annual National Model Aircraft Conference. 5. Hold an Academy annual dinner. 6. Publish a quarterly Academy Journal and a mid-month bulletin. 7. Take charge of the administration and award of the Moffet, Stout, Balfour, Model Airplane News, etc., Trophies and in addition will establish in recognition of flight performance, research and development and service to model aeronautics such awards as medals, certificates. 8. Be charged with the organization supervision and conduct of the technical contest phases of the National Meet. 9. Subject to review of the N.A.A., the Academy will be charged with the drafting of all regulations governing model aircraft competitions and model trials.

The balance of those elected into vari-

ous positions in the Academy are: Charles H. Grant, Chairman Gas Plane Section; Carl Goldberg, Rubber Powered Section; Paul Garber, Scale Section; Howard M. Jellison, Chairman National Meet Committee; H. T. Sommers, Chairman National Conference Committee; The Board of Admission will be made up of the above individuals plus the retiring Presidents of the Academy.

Youth Education Topic for Planning Conference

One of the many important subjects contained in the Draft Outline for a National Aviation Program is that of Youth Education. There is recommended an integrated program, step by step for youth education and training carried out on a nation-wide scale under the direction of the N.A.A.

Gas model building, soaring and gliding, and light plane flying are all included in the program which should be supported by the aviation industry and the government.

There should be federal legislation establishing an aviation division in the office of education which would offer aid material for the setting up and conduct of suitable courses for the secondary schools, vocational schools and colleges, and would otherwise act to encourage school-time aeronautic education.

Rebuilding the British Air Force

(Continued from page 6)

sideways instead of backwards. The turtleback is higher and the rear hatches streamline into it; also the horizontal tail is on top of the fuselage similar to the Vultee Attack. The engine is a R.R. Merlin of 950 hp.

The Bristol "Blenheim 142M," the cause of all this furor, is probably the highest performance bomber in its class in the world. It has two Bristol Mercuries of 800 hp. each and is an all-metal, low-wing monoplane of stressed skin construction. A crew of three is carried and it has flaps and retractable landing gear. The maximum speed is approximately 330 m.p.h.

Another new high performance medium bomber is the Handley Page "Hampden," affectionately known as the "flying panhandle" due to the odd shape of its fuselage. It has two Bristol Pegasus XV engines of 900 hp. each. It is a mid-wing, cantilever monoplane with wings tapered in chord and thickness. The structure is all-metal with flush riveted, stressed skin covering.

The Bristol 130, a type not in common use in the United States, can carry 24 fully armed troops (not parachute jumpers) and a crew of three at a high clip. It is a beautiful ship, clean and well proportioned and is said to handle more like a small craft than a large transport-bomber. The wings, body and tail are metal throughout and the wings have split-edge hydraulically operated flaps. The landing gear is rigid and enclosed in pants. It has two Bristol Pegasus engines of 960 hp. each and weighs 9 tons fully loaded.

A newcomer in the British military field and one who should prove a stiff competi-

tor is Vincent Burnelli, who has arranged for the building of his designs over there. The U.B.14 type will be the first attempt, but instead of P & W Hornets, R. R. Kesrel Mk. XVI engines of 690-745 hp. will be used. It is to be used as a bomber-transport and produced by the Scottish Aircraft and Engineering Co., Ltd.

The Fleet Air Arm in England has always been treated as an orphan, snatching what crumbs it could from the Army. Their fighting equipment is chiefly Army types with the necessary modifications for Fleet work. The aircraft belonging to battleships and cruisers are particularly maligned. It really is a credit though, that the planes attached to naval units aren't shaken apart by the terrific shocks of the heavy guns and rolling, pitching seas.

A new capable design for this job is the Vickers "Walrus" amphibian pusher biplane with a Bristol Pegasus VI of 720 hp. It carries a crew of three and can be used for fleet spotting, reconnaissance and training.

In the torpedo-reconnaissance category we find the Fairey "Swordfish" biplane of orthodox appearance. Available either on wheels or floats, it is powered by a Bristol Pegasus IIIM of 690 hp. It can carry either an 18 inch torpedo or an equivalent of small bombs.

In the past year Great Britain has cleaned up her flying boat designs tremendously. Sometime ago three-ruddered, four and six-engined boats were not uncommon, each with a healthy dose of struts and wires and comfortable, seagoing accommodations. Now the move is toward smaller, twin-engined craft with much cleaner lines that combine high performance with a long cruising range. Typical of these is the Supermarine "Stranraer," a six place craft of pleasing design with two Bristol Pegasus X engines of 950 hp. each. The hull is of Alclad and the wings are metal, fabric-covered. Accommodations are provided for cooking and sleeping. The service ceiling is 14,760 feet and it weighs 11 tons loaded.

Looking the trainers over we find that up to now few of these were specifically designed for their job, and are really commercial models altered to suit the purpose. But now it would be a decided handicap to train a student in these and then expect him to be an expert in handling a Hawker Hurricane or a Fairey Battle. It would certainly provide the countryside with plenty of nice metal and tubing for house building. The Air Ministry has realized this and will soon take delivery on a new DeHavilland low-wing trainer with a geared and supercharged Gipsy XII fitted with a controllable pitch propeller.

Airspeed is building a dual control version of their convertible Envoy as a trainer for bomber pilots. Full military equipment will be carried.

So looking these types over it looks as if at last an emancipation has taken place over in England. Due in no small measure for their terrific success are their splendid power plants and the willingness to put away the old and go on with the new. It's hard to try and outdo a spirit like that and it looks like congratulations are in order.

BERKELEY THE FINEST IN GAS MODELS

It gives you real satisfaction to know that when you finish building a Berkeley model you will have the best model that money can buy. In a class by themselves, they are truly the "Rolls Royce of model airplanes."

BUCCANEER STANDARD

\$5.00
P.P. in U.S.A. **Limited Engine Run Champion**



FIRST PLACE

Quaker City Meet, Sept. 11, 1937. 40 sec. Motor Run. 8 min. Official Time.

FIRST PLACE

Kresge Club Meet, October 16, 1937. 40 sec. Motor Run. 5 min. Official Time.

FIRST PLACE

M. M. L. Meet, October 31, 1937. 35 sec. Motor Run. 5 min. Official Time.

"BUCCANEER-STANDARD"

5 1/2-foot wingspan—1/8 to 1/5 h.p. motor

Everything you desire in a small gas model. Beautiful lines, easy construction, priced with the lowest. It has no competition for limited engine run contest flying!!

No model at even several dollars more is as near complete. The plans are full size and easy to follow with sketches and complete instructions. Hardware and ignition equipment. All wooden parts are printed out. You can build this model without spending one

penny more because we give a large can of cement and three colors of dope. Complete kit less wheels and power plant \$5.00 P.P. in U.S.A.

COMBINATION PRICE: "Buccaneer Standard" with 3/2" M. & M. Wheels, Model "C" Brown Jr. Motor and Propeller..... **\$24.00**



The "Super-Buccaneer" RECORD BREAKER

7 1/2 ft. Wingspan

During the Fall contest season, the "Super-Buccaneer" won first place in events at Philadelphia: Grand Rapids; Trenton; Severksy Field, Farmingdale; and Miller Field, Staten Island. Besides these first places, seven second places and four third places have been reported to us!!

KIT INCLUDES: Full size plans and complete instructions. Wooden parts printed out. Hardware and ignition equipment. Pint cans of Cement and Colored Dope. Everything to complete the model as pictured except power plant and wheels.

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COMBINATION PRICE

"Super-Buccaneer" with 4 1/2" M. & M. Wheels, Model "C" Brown Jr. Motor and Propeller..... **\$27.50**



The New "CUSTOM-CAVALIER"

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9 foot Wingspan

"THE ARISTOCRAT OF MODEL AIRPLANES"

Simplified MONOCOQUE CONSTRUCTION—for 1/8 to 1/3 h.p. Without doubt, the most beautiful and durable model airplane produced. When you own a "Custom-Cavalier" you are "tops" among model builders. On test flights with only one minute motor run, the "Custom-Cavalier" glided over 30 minutes. Kit is complete even to silk for covering and "pearlene" dopes. Everything to build the model as pictured except wheels and power plant. \$15.00, P.P., in U.S.A.

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OHLSSON 1935 GOLD SEAL

Berkeley is proud to announce Eastern Distributorship for this amazing new engine. Immediate delivery from stock.

\$18.50
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NOTE: We can supply any of our kit combinations with this amazing new engine. \$1.50 extra.

FREE PROPELLER WITH EVERY NEW MOTOR

Write for the very best allowance on your old motor, regardless of make or condition. State make and model of your old motor when writing.

BROWN MOTOR

IN TWO MODELS

MODEL B

With ground and fitted steel piston.

\$21.50
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MODEL C

With Aluminum alloy piston and rings.

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TRADE IN YOUR OLD MOTOR

BERKELEY MODEL SUPPLIES

"FIRST IN GAS MODELS"

NOW LOCATED IN NEW AND LARGER QUARTERS

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Now the World's Biggest Quarters Worth! JOE OTT'S BIGGER, BETTER

Flying models



Only 25¢

Joe Ott Model Kits have long been known for superior design, high quality materials, excellent plans and ease of building. Here are eight of the best Ott twenty-five cent models that will give you a real thrill—six twenty-four inch models of famous ships which every builder wants—two twenty-eight inch contest type ships that are tops in flight performance. Get these new Ott kits from your dealer now. Enjoy the thrills of model building and flying at these economy prices.

Every Kit complete with full size three-view plan, detailed sketches showing each part during construction, rib sheet plainly marked and generous quantity of cement.

We also make six sixteen inch Flying Models to retail at ten cents each, packed seventy-two per carton, and six six inch Solid Models to retail at ten cents each, also packed seventy-two per carton. Send for catalog. All orders totaling less than ten dollars list carry a fifty cent service charge.

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Makers of Lincoln Logs and Allied Toys

24" WING SPAN TWENTY-FOUR INCH WING SPAN FLYING MODELS

Fairey Battle, Aeronica Cabin, Curtiss Coupe, Hawk's Time Flies, Gulf Hawk and Hawker Hart. Packed thirty-six per carton, assorted.

28" WING SPAN TWENTY-EIGHT INCH WING SPAN FLYING MODELS, CONTEST TYPE

Cloud Buster and Senior Cabin. Packed thirty-six per carton, assorted.

DEALERS

Give your customers what they ask for. These Kits make friends and repeat buyers. Airplane cement in tubes to retail at five cents each, packed two dozen tubes in counter display cartons. Order from your jobber or write direct to us.



Building a Successful Indoor Pusher

(Continued from page 35)

carve the blades. Sand them smooth and so thin that you can see light through them. The blades should have a camber of about $\frac{1}{8}$ ". The shape of the blades is shown in the plan. Bend the wire propeller shaft to shape as shown and place through center of propeller. Put washer on the shaft. At this time check the weight and balance of your propeller as it is the most important part of the model.

Adjust the model by first obtaining a smooth glide, then trying a flight using a few hand-wound turns. To make the model turn, bend the rudder slightly to the left. The torque of the propeller is offset by turning the bearing slightly. Try flying with both $\frac{3}{32}$ " rubber and $\frac{5}{64}$ ". Under very favorable weather and flying conditions the latter is desirable.

Air Ways

(Continued from page 31)

for only two are left. Of these two boys one has built a gas model and the other two snappy rubber jobs, one of twenty-six inches and one of thirty-six inches. Both fly well. Recently Dikel built a model for the Air Ways Endurance Contest. This ship made ten consecutive fifty-five second flights, one right after another as fast as the rubber could be rewound.

Picture No. 6 shows Sydney Wallerstein, a member of the Jordan Marsh-Boston Traveler Junior Aviation League, holding a model autogiro which he has just completed. This model won for him the rating of "ace" in the club. He is the fifth club flier to attain this honor in a membership of about 5000. Wallerstein is eighteen years of age and lives at 25 Wyoming Street, Roxbury, Mass. He joined the organization in 1929. Wallerstein is especially proficient in detail scale model building and won the league's last contest for that type of plane.

Bill Downey of 609 North Waco, Wichita, Kansas, is interested in speed. So, he recently set himself down at his workbench and turned out a racer. He is shown with it in picture No. 7. This little job is of original design and is similar to the racer used by the late Captain Page. The ship has a wing span of thirty-one inches and weighs about $4\frac{3}{4}$ ounces. It has a speed of about fifty-six miles per hour. The ship unfortunately met its end when the ceiling of a room in which it was reposing crashed down upon it. An airplane is seldom fortunate enough to have the ceiling crash in this manner; usually a plane finds great difficulty in reaching its ceiling.

Before its end Downey tells us that he gave an exhibition with it at the Wichita city contest and it went so fast that it almost left a trail of smoke behind it. At this rate it will not be long before speed model builders will become so proficient in the art that they will have to cover their planes with asbestos.

Vincent Anderson of 431 East Robert Street, Crookston, Minnesota, is a very serious minded young man who takes a

Pontoons for Your Gas Model

(Continued from page 16)

coat, smoothing it out carefully to eliminate ridges or wrinkles. Now, paint the pontoons with aluminum pigmented dope, and, after it dries, apply another coat of paper cement, which gives a shiny aluminum-like finish that is thoroughly waterproof. If you use plenty of cement in making all the joints and follow the above procedure, you'll have no trouble from leaks.

If your model has a fairly long fuselage, it would be a good idea to install a tail pontoon to save the empennage from a possible ducking. Make this pontoon in the same manner as the large ones, using one-fourth of the dimensions given in the plans, except the beam, which should remain 2-5/16".

To attach the pontoons, you simply remove the wheels of your model, slip the extra struts in position, put on the pontoons and install the spreader bars. The rubber bands illustrated are merely to hold the extra struts until you attach the spreader bars, after which there is no lateral load on them. So you see the rubber bands provide an adequate fastening for the struts.

Since the landing gears of most well-designed gas models are well forward of the center of gravity, but still not too far, the pontoons will be located properly if the mounting blocks are placed in the positions indicated. Generally speaking, a line drawn between the center of gravity

of the model and the geometrical center of the pontoons should make an angle of about 5 degrees from the vertical. In other words, the center of the pontoons should be 5 degrees forward of the center of gravity.

Dimensions given are suitable for models weighing between $3\frac{1}{2}$ and $4\frac{1}{2}$ pounds. For heavier models, increase dimensions by one-half, making the pontoons 30" long.

Build the Baby Arrow Pleasure Plane

(Continued from page 9)

covered. Here is a hint on doping wings: Run the strokes back and forth from leading edge to trailing edge. First dope the top of the wing, between two ribs, then dope the bottom of wing between the same two ribs, thus doping the top and the bottom of the wing at practically the same time. This prevents the wing from bending, as you know dope tightens or shrinks the tissue. If just the top of the wing were doped, it would bend the wing upward before you had time to dope the bottom.

You should not have any trouble in building this model. However, if any further information is needed regarding the "Baby Arrow," just write the author in care of MODEL AIRPLANE NEWS enclosing a self-addressed stamped envelope.

Dealers Attention!

The biggest selling scoop that the model plane industry has ever witnessed bursts in 3 weeks. Thrilling nation-wide flight contests—the biggest money-prizes ever offered contestants and dealers together! —national magazine and newspaper advertising!—national publicity!—free ads for you!—new buyers to your store!

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GAIN — It only costs a 6c airmail stamp to get the advance plans of the campaign so that you'll be prepared to get your share in the results.

MAIL COUPON NOW!

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Send me advance plans of contest so I'll be ready to cash in on results. No obligation. All information Free!

Name of Store _____

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The section of city I serve is known as _____

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HUSKY JR. WINS with ease over (30) Models

powered with the best motors others had to offer—Read what CHAMPION GORDON CHENEY has to say:

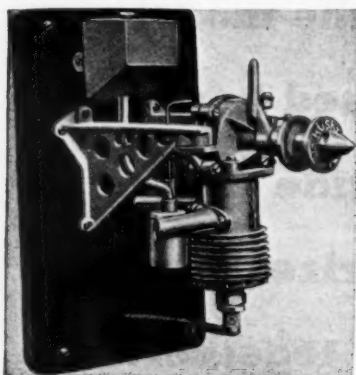
DOUGLAS MODEL AIRCRAFT CO., 1400 No. 45th St., Seattle, Wash.
Gentlemen:—My Husky Jr. engine proved itself very efficient at the recent Northwest Gas Model Association Contest by flying my model to win first place. The span is 6 feet 6 inches and it weighs 3¼ pounds. The easy starting, power, and low fuel consumption is what makes the Husky Jr. a contest winning motor. Yours truly, Gordon Cheney, Northwest Gas Model Champion.

4502 46th S. W., Seattle, Washington,
January 5, 1938.

Watch for the New Sensational Douglas-E-GULL Gas Model next month.

EXCLUSIVE FEATURES Found only in a HUSKY JR.

"VANISIL" ALLOY (PAT.) PISTONS and RINGS are most RESISTANT to WEAR of any other Alloys and POSITIVELY will NOT SCORE cylinder walls, insuring PERFECT COMPRESSION and CONSTANT POWER at all temperatures. "VANISIL" Dissipates heat so Rapidly, the HUSKY JR. never overheats. Clearances are Maintained by Equalized Expansion of Cylinder and Piston REGARDLESS of Temperature. The HUSKY JR. runs 20 minutes on two pen cells and starts



Douglas-Designed Endurance Models

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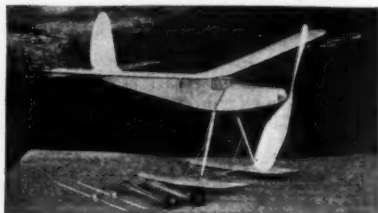
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great interest in model building. He is shown in picture No. 8 with two of his ships. He says that the Monocoupe which he is holding in his right hand is about the best model he has ever built. The uncovered Fokker in his left hand was built from plans in MODEL AIRPLANE NEWS. The ships are very beautifully made as you can see, and were prominent in an exhibition given at Crookston.

Good flight pictures are rare. However an excellent one, picture No. 9, was sent to us by Arlo Koontz of Onawa, Iowa. The ship is a Jimmie Allen Sky Raider in full flight. He says:

"The plane has had many narrow escapes. Once it was nearly wrecked by an old hen. The model was coming down to land after a flight, when it coasted right down on top of one of the hen's chickens. The hen evidently thought it was a hawk, for though it was a bantam it sailed into the plane and nearly knocked out one side."

This appears to be a new hazard for airplanes, one that we had not counted on so far.

Picture No. 10 shows a six inch Vultee V-1A and the trophy it won for Vito M. Garofalo of 1406 West Taylor Street, Chicago, Illinois. Garofalo's brother's god-father is an artist who created a background which appears most attractively in the picture. The remarkable thing about this model is that it was built from a ten cent kit. Garofalo made a few slight changes which improved its construction and appearance. A few extra decorations made the job complete. It is built up and covered with tissue. The control surfaces, American Airlines letters and fuselage lightning strips are made of red tissue, outlined in striped

pieces of black tissue 1/32" wide. In other words, the decorations are tissue and not painted on. The contest which it won was sponsored by Elman's book and airplane shop in Chicago.

MODEL NEWS FROM OTHER COUNTRIES

Canada

Mr. Frank Leet of Markham, Ontario, Canada, sends us picture No. 11, which shows him holding his Wakefield model which he entered in the Canadian Championships of 1936. He says he has had some very fine flights with it, as high as 3 minutes, 25 seconds. The wing span is forty-three inches. A Clark Y wing section is used. The propeller is seventeen inches in diameter and the whole ship weighs 5¼ ounces. The propeller is driven by twenty-four strands of 1/8" x 1/30" rubber. In order to insure little propeller bearing friction a ball thrust arrangement is used.

Australia

We have received a very complimentary letter from Jack Bibbing of Penola Road, Mt. Gambia, Australia, which makes us feel as if the work of our magazine is not in vain. He says:

"I would like to say that MODEL AIRPLANE NEWS is the best model magazine I have read yet and the most educational. Since reading the issues from July 1936 I have learned a great deal more than I had ever expected to from a model magazine."

We certainly hope that Mr. Bibbing continues to receive useful information from our publication. Mr. Bibbing also says there is no official club in his neighborhood but there are a few model build-

ers who had some interesting flights. He built his first machine about eight years ago, constructed of bamboo. The thought of those days often makes him laugh but it served as a foundation for a hobby which he has found a great asset.

Bibbing wants to know if any of the readers have plans for a scale model of a Douglas Transport. He is most anxious to correspond with other readers throughout the various parts of the world.

Italy

Mr. Enrico Barzetti of Viale Reg Margherita 83, Livorno, Italy, sends us news of model activities in Italy. A national model contest was held October 10th and 11th in Rome. In the open event for fuselage rubber-powered models, Bruno Saltini of Modena won first place with 4 minutes, 44 seconds. Alessandro Guercetti of Turin was second with 2 minutes, 31 seconds. In the open soarer event Bagalini Marino of Milan was first with 4 minutes, 44 seconds and Radorigo Mario of Rome was second with 4 minutes, 2 seconds. In the event in which young men from model schools entered their ships, the Bologna Club won first place with an average of 2 minutes, 11½ seconds. The Modena Club just missed first place by two seconds, taking second with 2 minutes, 10 seconds. The winner of the open glider event for young men under sixteen was Giorgio Bonsi of Florence. He had a time of 10 minutes, 13½ seconds. Guido Giolitto of Turin placed second with 3 minutes, 57½ seconds.

From this it would appear that powering a ship is "merely a waste of time," as the flights of the gliders exceeded the times of the rubber-driven models.

CLUB NEWS

Illinois

Frank J. Parykaza of the Illinois Model Aero Club, 430 South Michigan Avenue, Chicago, Illinois, sends us some news. He says they are getting their models in shape for the winter contests. Every Saturday the club flies at the 132nd Armory in this city. At the meetings, which are held every first and third Friday of the month, at 8 p.m., interesting new features are discussed. Anyone interested is cordially invited to attend. One of the subjects of intense discussion is the possibility of radio control of gas models. The outdoor flying season was ended by the staging of a few club contests. Walter March ran away with the honors.

Massachusetts

The Jordan Marsh-Boston Traveler Junior Aviation League announces the first half of its 1938 season with bigger and better contests and meetings for its more than 500 members.

Official sanction has come from the National Aeronautic Association for these



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meets, so any new marks which are set by the junior flyers will constitute national records. The grand prizes towards which Leaguers are working are all-expense trips to the Nationals in Detroit next July. In addition, transportation will be furnished those who place in runner-up positions.

It is expected that almost a dozen Boston flyers will represent the J.A.L. at the National battle. To determine the winners of these trips, the Jordan-Traveler point system has been in operation during the past fall season and will continue through the June contests. High-point winners are those receiving trips.

The first outdoor meets will be run off at Smith Playground, Allston (Boston) from 10 a.m. to 1 p.m. on the following dates: April 30 and May 14.

The big news from League headquarters is the announcement by officials that the Northeastern States Championship Model Airplane Contest will be held indoors at Boston Garden on June 4 and outdoors at Harvard Practice.

The Northeastern States meet will be open to all model builders from all sections of the country and Canada and will offer more cups, trophies, plaques, gas engines and other prized awards than ever before. And take it from those who have captured awards in past years—they certainly are worth fighting for!

In addition to all these contests, weekly Saturday meetings are held in Jordan Marsh Company's ninth floor annex auditorium under the leadership of Gunnar Munnick, League director. Aviation personalities are featured guest speakers and instruction periods are frequently held.

J. A. L. Activities For 1937-1938 Season:

Jan. 8	Contest	Irvington St. Armory	Stick, fuselage
Jan. 15	Meeting	9th Floor Annex Auditorium	
Jan. 22	Contest	Irvington St. Armory	Glider, scale, Guillow, experimental
Jan. 29	Meeting	9th Floor Annex Auditorium	
Feb. 5	Contest	Irvington St. Armory	Stick, R.O.G.
Feb. 12	Meeting	9th Floor Annex Auditorium	
Feb. 19	Contest	Irvington St. Armory	Glider, scale, Guillow, experimental
Feb. 26	Meeting	9th Floor Annex Auditorium	
Mar. 5	Contest	Irvington St. Armory	Stick, fuselage
Mar. 12	Meeting	9th Floor Annex Auditorium	
Mar. 19	Contest	Irvington St. Armory	Glider, scale, Guillow, experimental
Mar. 26	Meeting	9th Floor Annex Auditorium	
Apr. 2	Contest	Irvington St. Armory	Stick, R.O.G.
Apr. 9	Meeting	9th Floor Annex Auditorium	
Apr. 16	Contest	Irvington St. Armory	Glider, scale, Guillow, experimental
Apr. 23	Meeting	9th Floor Annex Auditorium	
Apr. 30	Contest	Smith Playground, Allston	N.A.A. outdoor categories
May 7	Contest	Irvington St. Armory	Stick, fuselage
May 14	Contest	Smith Playground, Allston	N.A.A. outdoor categories
May 21	Contest	Irvington St. Armory	Glider, scale, Guillow, experimental
May 28	Meeting	9th Floor Annex Auditorium	
June 4	Contest	Boston Garden	Indoor Northeastern States Meet
June 5	Contest	Harvard Practice Field	Outdoor Northeastern States Meet

New Jersey

James Piccolo of the Atlantic City Model Airplane Club, Atlantic City, New Jersey, sends us a report of activities of this organization. They recently staged a contest on Sunday, November 28th, at which the unofficial world's record for autogiros was made by John Ginetti with a flight of one minute, ten seconds. Unfortunately the contest was not sponsored by the National Aeronautic Association; therefore, the official flying record of fifty-four seconds established by Carl Goldberg still stands. This club meets

every Monday evening under the auspices of the Y.M.C.A. at the "Y" Building, Pacific Avenue, Atlantic City. Alvin Gaskill is president.

New Jersey

The third annual municipal championship held by the Linden Model Aircraft Club, sponsored by the Linden Recreation Commission, was recently held at South Stiles Street Field, Linden, New Jersey. Roy Messinger of 317 Helen Street captured the senior championship of the city when he won both events. Richard Egles

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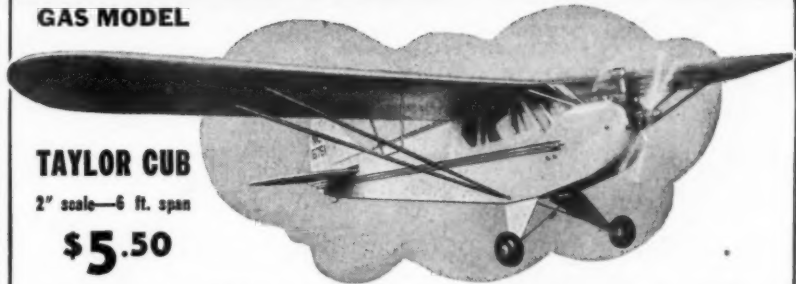
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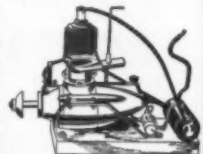
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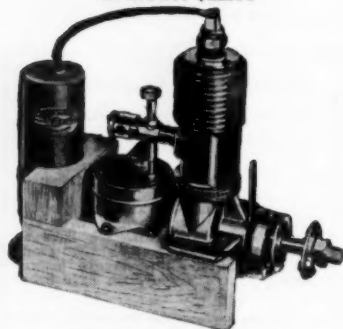


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held the championship for the past two years. Alex Pawlikowski, 13 years old, of 100 East Morris Avenue, was crowned the junior champion.

Following is a complete report of this event:

The meet was supervised by Recreation Supt. Frank Krysiak, an inspector for the National Aeronautic Association, which sanctioned the races.

John Gudalis created a new record for the juniors in winning the glider event with a forty second flight.

Following are the results: Senior division: fuselage open event: first, Richard Egles, 1:42 minutes; Carl Frank, 1:06 2/5 minutes; Eugene Matrejek, 57 1/5 seconds; Roy Messinger 54 2/5 seconds; Silvio Colletti, 48 1/5 seconds; fuselage event for city championship, first, Roy Messinger, 1:24 1/5 seconds; second, Silvio Colletti, 1:21 4/5 seconds; third, Richard Egles, 58 seconds; fourth Eugene Matrejek, 50 seconds; and Carl Frank, 50 seconds; stick event for city championship, first, Roy Messinger, 1:46 minutes; Richard Egles, 1:14 2/5 minutes; Eugene Matrejek, 1 minute.

Junior division: Glider event, first, John Gudalis, 40 seconds; Alex Pawlikowski, 28 seconds; third, Joe Prsybyski, 27 1/5 seconds; Robert Egles, 23 4/5 seconds; Charles Boehm, 23 4/5 seconds; fuselage event first, Adolph Pribush, 50 seconds; second, Alex Pawlikowski, 48 2/5 seconds; third, Hampden Smith, 36 4/5 seconds; George Yrshus, 56 1/5 seconds; Joe Prsybyski, 32 seconds;

stick event, first, Alex Pawlikowski, 1:01 minutes; second, Hampden Smith, 48 1/5 seconds; Joe Prsybyski, 38 1/5 seconds; George Yrshus, 36 1/5 seconds and fifth, Charles Boehm, 31 1/5 seconds.

Pawlikowski won the stick event with his last flight which happened to be the best his plane had in this competition, giving him the championship.

Kansas

At the seventh annual model airplane contest sponsored by the Kansas City Chapter of the National Aeronautic Association 200 contestants competed for prizes. A crowd of 5000 persons witnessed the flights. There were three events for rubber powered models. The winner of the event in the Jimmie Allen type of plane was Floyd Field of Emporia, Kansas. In the winning event Field lost his plane, which had also won the contest at Wichita, Kansas, on September 12th. The winning time was 3 minutes, 42 3/5 seconds, after which the ships passed out of sight. Field has won the Jimmie Allen race at Wichita for four successive years. Floyd lives at 1128 West 11th Street. The other winners in this event were Jim Walker, second with a time of 2 minutes, 7 seconds and Robert Willoughby, third. Both boys also live in Emporia.

Massachusetts

The Wachusett Model Aero Club of Fitchburg, Mass., entertains its members by showing movies. At the suggestion of several members it was decided to charge a small fee of 10c in order to defray expenses incurred. Here is an idea for other clubs, as movies are always interesting when shown at club meetings.

We see from "Wing Overs," the weekly organ of the Jordan Marsh-Boston Traveler Junior Aviation League of Boston that several members of the J.A.L. have won the following trophies:

M. Morin—Robert M. Love Trophy for flying scale models.....	:55
H. Phillips—Edward R. Mitton Trophy for indoor stick type R.O.G. Models.....	12:26
T. Capo—Lieut. Henry B. Harris Memorial Trophy for Indoor fuselage R.O.G. models.....	8:34.8
T. Capo—101st Observation Squad, Mass. Nat. Guard Trophy for stick type indoor hand-launched models	12:25
Wallerstein—Frederick L. Ames Memorial Trophy for longest flight outdoors with any model....	12:52

NOTICE

Mr. Alan E. Helseth writes and forwards plans of the Wiley Post training biplane, which were requested through the "Air Ways" column sometime ago by another reader. If this reader will communicate with us, the plans in question will be forwarded to him. However, Mr. Helseth, himself, desires plans of the Boeing F4B-4, if obtainable. Inasmuch as he did not include his address with his letter, if someone has such plans, will they forward them to Mr. Helseth, care of MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City.

Build and Fly This Miniature "Cub"

(Continued from page 36)

then tested for their tension, flexibility and shock absorbing qualities.

Windshield Detail

Skill in constructing the windshield is as important to the appearance of the Cub as is the skillful application of rouge to a girl's cheeks. It must be perfect to get the desired effect. Windshield formers W-1 and W-2, Plates 2 and 3 respectively, are cut to shape from medium grade balsa to the dimensions listed. The next step is to obtain a medium grade of balsa block measuring 1-7/16" x 2-11/32" x 4-11/16" and proceed to carve to shape shown by its side and top views, Plate No. 3. The inside portion below the dotted lines (side view windshield cowling detail) is hollowed out and finished with clean sanding. Now, cement W-1 to the front end of the block and W-2 to the rear end and complete by shaping the top side of the block using the formers as guides.

The next step is to cement the two supporting members 3/32" x 3/16" x 3/4" just behind the former W-2. A small triangular block is cemented into position on both sides, the location of this block which is shown clearly in the side view windshield detail on Plate No. 3. Now, two additional members cut to size from 3/16" sq. hard balsa are cemented into position after insertion holes have been made in the top cowling block. Notice carefully the depth and angle in which the insertion holes must be made. Apply cement generously in the holes and also at the joining tips. See all three views on this.

The curved portions of the wire beading to which part of the celluloid is cemented, is shown in 1/4" graph squares. First make a complete full size drawing of the side and top view. Then carefully bend the wire beading to the required shape, making sure of course, that sufficient wire has been left over so that it may be cemented to the frame members and bound with strong white thread. The drawing details depict this very clearly. Upon completion thus far, saturate the entire wood frame with two coats of clear dope and afterward sand to a smooth finish. Using a sheet of celluloid measuring about 8" x 10" cut out the windshield pattern as near as possible and cement carefully along the top of the windshield cowling and the wire beading and flush to the side angular members. Later trim the excess celluloid carefully. For additional safety use a thin applicator in applying a thin ridge of cement along the edges where the celluloid and the wire beading meet. The pin and eyelet details shown in front, side and top view drawings indicate the position for tie down hooks.

Covering the Cub

In applying the silk material to the wings, tail surfaces and fuselage, be sure that the threads always run in the same direction. Whatever part the builder chooses to cover first, exercise care and neatness. For assuming the woodwork done on the model is your masterpiece, no one will ever be aware of it, should

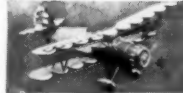
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the silk covering be applied sloppily. Instructions that follow cover the fabrication of the wing. Use the same care throughout the rest of the surface coverings.

Obtain a large enough piece of light grade silk to cover the right half of the upper part of the wing structure. Apply regular Berryloid clear undiluted dope to rib R-1, and place a portion of the material over it allowing it to dry thoroughly. Repeat the act by applying dope along the top of rib R-5 and stretching the silk; hold it in that position until the dope dries. The next step is to apply dope along the tops of each rib after R-1, about three at a time, patting down the silk and stretching it firmly as you go along. In doing this however, do not attempt to attach the silk to the structure beyond the first spar nor at the very end of the trailing edge. When the silk actually tightens up on the tops of the ribs, then you may proceed to cement the rear portion of the covering to the trailing edge. Pull gently but firmly all the time to prevent any wrinkles from forming. The silk is then cemented over the leading edge of the wing doping an area covering about the space of three ribs. Aft of rib No. 5 use a separate piece to cover the sloping portion. The left half of the wing is of course covered in the same manner and technique. The center section is covered with a separate piece of silk which is securely held on its retaining edges by careful application of the cement.

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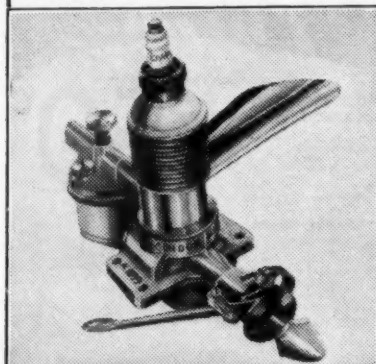
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extra care must be taken to apply the silk firmly to the undercamber of the wing section. Loose attachments may result in a definite change of the airfoil section. Apply the cement at the first rib and place the silk on immediately. In stretching, pull out towards the leading edge, the trailing edge and then towards you. This will lessen the chances of wrinkling. When you reach the metal fittings, simply slit the silk carefully with a razor, placing the material around it and touching up any open spots with a little dope. You'll get the idea all right as you go along slowly but surely. After rib No. 5 use a separate piece of silk and apply it in the same manner as executed on the top of the wing.

The stabilizer and rudder parts are covered carefully, one side at a time. Apply the cement generously to the wide frames and allow the silk to dry hard before going ahead. Stretch the material carefully three ways and complete by doping both parts with four coats of dope.

The fuselage is covered in sections, one side at a time. Use a sharp razor to trim the excess material. Use a regulation doping brush when doping the wings and fuselage. Be sure it is clean and free from loose hairs. It remains a good policy always to do the entire doping of the ship in room having a constant temperature. Dampness has a tendency to cause the dope to bluish which in itself is rather unsightly. The wing and fuselage can stand four to six coats of dope.

While on the subject of doping, it will be wise to apply a couple of coats of dope to both interior and exterior of the nose blocks. Sand the roughness down and then apply another light coat of dope. This will do lots to prevent the "throw off" oil from being absorbed into the porous balsa wood.

The entire ship being covered and doped and all external parts securely fastened in place, let's assemble the ship and see what she looks like. First, attach the landing gear to the fuselage by placing six to eight stout rubber bands between each of the tie down hooks of the fuselage and of the landing gear. Plate No. 7 shows the assembly detail very clearly so follow it closely. Note the position of the wing tie down hooks. These are inserted through the wing after it has been covered. Now set the wing into position. Fit the removable windshield in place. Does it fit snugly? Attach the rudder and elevators and bolt them into position securely. How about the engine? Use a Baby Cyclone engine with the old type gas tank mounting. Check on all the wires and see that all soldered joints are secure. Install fresh batteries and make contacts secure. Slide the engine mount skids onto the "L" shaped engine mount bearers and screw in the anchor bolts. Now attach the nose blocks and snap the tie down hooks into position. Last but not least, attach the wing struts. Well, there it is, finished!

The first chance you get on a nice calm day, take the ship outdoors and let the Cub spread her wings. In conducting the gliding tests, first remove the wing struts. While they add to the ship's scale appearance they don't necessarily make the Cub

fly any better. Glide the ship over tall grass if possible with the elevator and rudder angles set at zero degrees. Study each glide carefully and try to learn something of the ship's reactions to both fast and slow launchings. When the glide meets with your satisfaction, try the ship at some fast taxiing. Pour the correct gas mixture into the tank, start the Baby howling and let her ride around for a while. A good test is to have the ship running up hill with the engine fairly wide open. She won't get off very much but it will give you an idea as to how good the Cub can climb. Installation of a timing device is considered optional equipment and yet a wise thing to have around. However, you may still fly the Cub safely and sanely in a manner which the writer had the privilege of witnessing a short time ago.

Mr. C. H. Grant, whose many valuable and helpful suggestions went into the making of the Cub, conducted the test flights in a manner which worked so well we pass it on to you.

Obtain about a hundred feet of strong thread and wind around a stick. To the tail skid attach one end of this string securely and walk about fifty feet in back of the ship. Have your assistant start the engine (taking precaution of course, not to use more than two eye-droppers full of fuel) and open up the needle valve until you can feel the prop tugging. The assistant then takes his place at one tip of the wing to assist in keeping the ship on the runway and, at your signal, releases the ship. The Cub will get off after a short run and begin climbing. In the meantime keep pace with the ship and unwind the string from the stick a little at a time. Do not let the ship go free in any case. When you desire to return the model to earth cease running slowly, gradually hauling in on the string. The model will begin to settle but don't force it by violently jerking back on the line. This method of course, is purely "home-made" but with a little care and finesse you can have lots of opportunities to study flight conditions at comparatively close range.

Gas Lines

(Continued from page 25)

formula is as follows:

$$\frac{W^2}{(Cu)A} = 6 \text{ or more.}$$

The meaning of the symbols in the formula is as follows: W represents total weight of the model; Cu is the cubic inch piston displacements. In the case of the Brown this is 0.6. A represents the total wing area. The significance of the formula is that the greater the weight, the more the power or wing area, or both, may be. If the horsepower of the plane is increased

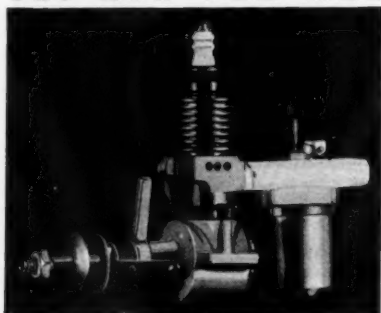
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found in the article, "Designing Your Gas Model," which appears on page 11 of this issue.

Mr. William Slaughter sends us picture No. 4 of a very beautiful job that has made over 43 flights to date, the longest of which was three minutes, eleven seconds, with a 35 second engine run. It has a span of six feet, nine inches, and is powered with a Brown Junior. We wonder how Slaughter was able to pose for his photograph with the motor running without the machine taking off. In the picture we cannot see any blocks in front of the wheels. Possibly he has brakes. If neither were employed we cannot help but feel he was taking a chance.

Picture No. 5 will reach the hearts of many builders. Unquestionably the gas model fan who has followed the game for any length of time will have executed the tragic pose which the picture shows. The gentleman in the picture is Allen Bedford of 33 Perry Street, Belleville, New Jersey, who is woefully looking at his wrecked ship after an unfortunate flight. He tells us that the ship was pretty well cracked up, but he won a trophy so there was some compensation for the damage.

We are especially pleased to have picture No. 6, for it gives evidence that the happiness and welfare of gas model fans in Massachusetts has been returned to them. It is a picture taken at a gas model contest held on a marsh near Lynn, about ten miles from Boston. The ground was a drained swamp and was quite soft, yet not too wet. This appears to be rather an ideal set-up for gas models. The soft ground unquestionably should reduce damages to planes which do not land in the proper fashion. The contest was held on November 7th and lasted all day. About a dozen models were present. The best time made was five minutes, by a model of original design. We are indebted for this information to Richard

LaCasse of 78 Fisher Avenue, Roxbury, Mass. He tells us that the same old bugaboo appeared to exist—the contestants had trouble starting their engines immediately due to the habitual procedure of not checking their engine thoroughly before coming to the contest. When will model builders gain wisdom concerning this phase of gas model aviation? It is so easy to go over your engine thoroughly and be sure of its proper operation that it is difficult to understand why young men act in such a haphazard fashion and trust to luck. With rubber models this may work fairly well, but under these conditions a tricky gas model engine is bound to cause trouble. Many builders have wasted money and taken long trips to contests without being thorough in their inspection of the ship before going to the meet.

Mr. Frank B. Knapton of 1406 West 105th Street, Los Angeles, Calif., has been kind enough to send us picture No. 7, which is rather unusual. It shows a group of members of the Gas Model Airplane Association of Southern California with their planes in front of a "retired" transcontinental plane. The plane is an old four-motored monoplane, which is used as an eye-catcher for the Happy Landing Service Station. A number of years ago this plane was exhibited at the New York Airplane Show and was the outstanding exhibition of advanced transport airplanes.

It is interesting to note that most gas model fans in California design scale models, or near scale models. Some create ships of original design. The latter practice is followed almost universally in the east and mid-west. Here looks are secondary to performance. The ship is designed primarily for performance. Nevertheless many of these scale model ships give remarkable performance. Possibly the western boys are more inclusive in their conception of a gas model.

Mr. John McMillan of Walnut, Calif., Box 217, sends us picture No. 8, which shows his Curtiss Robin gas model. It is a very fine-looking job from an appearance standpoint; however, he tells us that he has had trouble in flying it. It appears that the ship will run along the ground and will not take off. Instead, it turns left or right, as chance may direct. He wishes to know what the trouble could be. From the appearance in the picture we would say that the trouble does not lay within the design of the ship from an aerodynamic standpoint. We advise that he check the position of the center of gravity, which should be approximately 40% to 50% back of the leading edge of the wing. The stabilizer should be set at about one-half degree positive angle of incidence relative to the thrust line. The ship weighs four pounds and is of six feet spread.

Judging from Mr. McMillan's remarks we would say that the engine lacks sufficient power to take the ship off the ground. A loading of four pounds for this wing span is rather high and probably the engine is not "revving" over fast enough to develop sufficient thrust. When the engine is running at full speed it should pull $2\frac{1}{2}$ pounds at the least in order to have the plane fly properly.

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squadron leader of the South African Model Airplane Club, Cape Wing No. 1 Squadron, sends us picture No. 9. Here you see him watching his model, "Pop Hi-2" taking off and making tracks for higher altitudes. He says there is considerable activity with gas jobs in South Africa. The longest flight to date with his model is twenty-three minutes. It passed out of sight at an altitude of about 3,000 feet. This little ship has been flown regularly at all contests and is consistent and steady in flight.

Mr. Gordon P. Smith of New Plymouth, New Zealand, P.O. Box 260, sends us news of the Taranaki Union of Model Flying Clubs. One of the most built airplanes in the world today is the KG model, designed by Mr. Charles Grant and built by Mr. Joseph Kovel. Mr. Smith sends us picture No. 10, which shows one of these ships, built by J. I. Mehrtens of Ngongotaha, New Zealand. Mr. Mehrtens as yet has not flown the ship as he had only a Baby Cyclone engine which he did not believe developed sufficient power for it. He intends purchasing a Forster Brothers engine and installing it in the plane. The Forster engine is ideally suited for this plane, and with it the ship gives an unusual performance. Even with the Brown engine, which develops 1/5 horsepower, the KG placed second in the gas model event of the National Competition held at Akron, Ohio, in 1934, with a flight of about fifteen minutes. The Forster Brothers engine develops from 1/3 to 1/2 horsepower.

Mr. Kenneth S. Gerravette, Secretary of the Noroton Heights Gas Model Club, 72 West Avenue, Darien, Conn., sends us picture No. 11, which shows Dick Lienert, a club member, holding his Quaker gas model powered with a Brown engine. To date it has made 45 successful flights.

All Connecticut gas model fliers should write to the N.A.A. for application blanks for the new gas model division. The new

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in the territory, was held on August 29th. The contest started at 10:00 A.M. and lasted until 5:00 P.M. We had twenty-five entrants. Despite the small number of entrants, we had several thousand spectators, as the contest had been well announced ahead of time. The club had signs made to direct traffic to the parking lot, and the Army stationed military police to direct the parking. The Air Corps also sent timers with stop-watches and an army truck in which to chase models. The contest was run on a point system, the duration of the flight counting for about one-fourth of the total points. Other factors judged were stability climb, take off and landing. The entries ranged in size from an Elf-powered "Mr. Mulligan" to a Brown-powered KG-3. First place was made by Wah Kwock Shun with a six foot Ohlsson-powered model of original design. He made an average of 96 points for his three official flights. Second place was won by George Abili with a Cyclone-powered "Quaker Flash." He made an average of 94 points, and the longest flight of the day, which was 2 m. 10 s. Third place was won by Robert Fukuda with 84 points. Following came Billy Lee, Eyvin Schoenberg and Richard Lau in the order named. Prizes were donated by National Clothing Co. of Honolulu, and Mr. Barney Snyder of Modelcraft, California.

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First prize was a gold cup. Second prize was a Pacific Ace Kit, and third through seventh places were given props, paint, balsa, etc. The most unusual plane at the contest was a five foot twin Elf-powered Martin Bomber scale model. Almost all the planes were of conventional high-wing design. The KG was the only large plane on hand. However, several large "floaters" are being made at the present time. Also under construction is a twin engine Sikorsky S-43.

"Although our first contest was not very large, as far as size is concerned, it has given us experience and a good name, and in the next contest we may be reasonably sure of more public support and financial aid.

"We are just waiting for the time when we will be able to send a contestant to the Nationals. This time may not be so far off, either, for more and more adults and influential business men are beginning to get interested in our activities."

Picture No. 12 shows Mr. Shigua Oka starting his Brown Junior, which is mounted in the first KG-3 in the Hawaiian Islands.

Mr. Robert E. Lee of 5501 45 Avenue South, Minneapolis, Minnesota, sends us picture No. 13, in which he is shown with his ship which won first place in the Minnesota State Meet held by the St. Paul Aviation Club on Sunday, October 24th. There were about 60 planes entered in the two events—forty second engine run and limited fuel of 1/16 oz. per pound of weight. The winning flight with forty second engine run was two minutes, fifty-six seconds. Second place was won with a flight of two minutes, forty-nine seconds, by Bob Apgar.

UNIT NEWS

Illinois

R. Gillespie, acting secretary of the Alton Gas Model Association, Alton, Illinois, Unit 87, tells us something of the activities of this organization.

"Our club was organized on February 20, 1937. At that time our club had five charter members. Since then we have been quite active and have received into the club one new member, which raised the total to six. The first thing we did was to secure permission to use a down town store window for an exhibition of our planes. For one week, from Saturday, April 17 to Saturday, April 24, we had five ships in the showroom of the local Ford dealer. We had three completed models and two skeleton models. For this we received quite a nice bit of publicity. Our next step was to arrange a flying meet between our organization and the Midwest Gas Model Engineers of St. Louis. This took place on the 16th of May on our newly acquired flying field just north of Alton. The field is one of forty acres about two miles north of town. Owing to certain difficulties the meet was not official. However, we had twelve ships there, and one, owned by a St. Louis boy, was sent out of sight in four and one half minutes on a trial spin. We recovered the ship two days later about five or five and one-half miles from the field. As a result of these activities we have received several nice write ups about them in the local newspaper."

Los Angeles, Calif.

Barney Snyder of 7306 Vermont Ave., Los Angeles, Calif., writes and tells us something of how contests are run in Los Angeles. He says:

"We flew from an airport for a year or more, before getting our own field. We can return to the airport at any time we desire, there are no hard feelings. To get our own field we had to have a club. To have a successful club we had to have the support of ALL the dealers. Most clubs are sponsored by a dealer and are formed with the idea on his part of getting more sales and on the part of the members of getting reduced prices. Our club will not allow any dealer to give discounts to members because they are members. To prevent a dealer from running the thing we made a rule no dealer can hold an elective office. Result—100% dealer support. We have among our members Dan Bunch, owner Bunch Model, Jim Blackton of Denny Industries, Bill Atwood and Mel Anderson of Cyclone Motors, Irwin Ohlsson of Ohlsson Miniatures, Hal Atkins of Trojan Motors, Jack Keener of Brat Motors and Barney and Peggy Snyder owners of Modelcraft, the Western representative of Comet model and the owners of most of the retail stores. We need them all to make the club a success. They need the club to promote more interest.

"To join our Assn. you must own a gas model. Entrance fee is \$1 and dues 25¢ a month. All members use the field with out charge if their dues are paid. Nonmembers pay 5¢ each and 5¢ for each ship on Sundays, all other days the field is open to all with out charge. Spectators contribute 5¢ each. The Sunday gate pays the rent and upkeep of the field. We also make and enforce all necessary rules even to grounding a ship if necessary.

"Long ago we recognized two facts, first duration contest were fine for rubber models but were out for gas models, second models

had to be smaller with a high wing loading to keep them from drifting all over the country. Flights should be short with models landing on our field if possible. Flight timers were necessary, even the first gas models had timers. Builders learned it was more fun to make 20 short flights than to make one and spend the rest of the day hunting for their ships.

"Our first contests were precision (so called) the idea being to run the engine 20 to 30 seconds and drop the ship in as close as possible. This type contest was discarded because it did not advance the cause of model building, there was no incentive to better the ships. Judging such a contest required expert gas model builders and designers. Air line pilots, and aircraft engineers were used, men who knew nothing of gas models, they thought a model should make a 3 point landing because it had a tail wheel on it. There were only 6 or 8 persons out of Los Angeles' 3 million who were capable of judging such a contest and they knew better than to try. If there were 80 contestants in a contest there were 79 squawks when it was over.

"We developed a squawk proof contest (something that can not be said for the Nationals) that met all other requirements and advanced the type of ship built by contestants. We call it limited duration. Engine run is limited to 35 seconds, each second of flight from take off to landing is one point. Monoplanes must have a wing loading of not less than 12 oz. to the sq. ft. Biplanes not less than 8 oz. to the sq. ft. Low wing monoplanes, anything. Two stop watches on each ship, one to check the engine run, the other to check the complete flight. Also we have two club officials with watches who check all those persons who make a habit of squawking, we know them, but no one knows where those two watches are except the board of directors. You can't argue with a stop watch, and every contestant is shown the watch at the end of his flight.

"We still allow pushing at the take off but soon the contestants will have to lift their hands from the model and let it take off by itself. This will make the boys build smaller ships, which will together with the required wing loading cut down the length of the flight. As the ships get better the requirements will be changed to keep flights short. We would like to keep the winning time between 2 and 3 minutes.

"If necessary the engine time will be cut to keep flights short, because only by short flights can we keep ships on or near our field.

Important Notice

MODEL AIRPLANE NEWS is always glad to consider any manuscripts, plans, etc., sent to us for publication. However, return postage *must accompany* all such work. We will not undertake to return any rejected material unless this is done.

Correction

In the December issue of "Gas Lines" we printed that F. C. Hubert was leader of Unit No. 77, called "The Winged Demons." This is an error. Mr. Hubert is leader of unit No. 71, called "Mauquenaus Gas Model Club."

2 Sensational NEW GIANTS!



AERONCA "K"

Scale: $1\frac{1}{2}" = 1'0"$

54" WINGSPAN

\$1⁰⁰



COMET

47½" WINGSPAN

\$1⁵⁰

Scale: $1\frac{1}{4}" = 1'0"$

HOWARD DGA-9

COMET DOES IT AGAIN!

Here are two outstanding additions to Comet's famous line of "Giants"! Both have real built-in flyability—and each kit is a marvel of completeness! Details include shock-absorbing landing gears, removable wings, cabin doors that open and reveal complete interiors, movable controls and plenty of rubber to assure successful flights.

Kit No. P-2. The Aeronca "K" with its big 54" wingspan has amazing stability. It's a real scale model built in cooperation with the company that builds the actual ship. A genuine Comet value at only \$1.00.

Kit No. T-1. The Howard DGA-9 is the result of 12 years of experimenting by Ben O. Howard, prominent racing plane designer. No skimping—this is a really complete kit—full 47½" wingspan. Turned cowling front, seats in cabin and a world of other details. Your money's worth and then some at only \$1.50.

Add 15c postage if ordered from us; none if ordered from dealer.

The COMET GAS MODEL



6 ft. Wingspan—Curtiss Robin

Still way ahead of anything in the gas model field. First in flyability, completeness and finished parts! Overall length, 46". Weight 2 lbs., less motor. Takes any ½th or ¾th H.P. motor. 3½" airwheels. Send 3c for catalog of Gas Model and other kits.

\$6.50

less motor

\$4.95

less airwheels

Postage—east of the Mississippi, 30c; west of the Mississippi, 50c; none if ordered from Comet dealer.

The GRUMMAN GULFHAWK

Amazingly complete, exact model of Grumman Gulfhawk which was made to order for Al Williams! All controls movable from cockpit. Retractable landing gear. Many parts furnished complete or semi-complete, shaped struts, tail block, wheels and landing edges; completed gas tank—even dressy decalcomania! Generous quantities dope, \$3.95 other materials.....



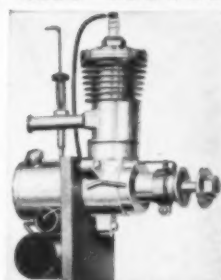
Exact Scale—1"=1'0". Wingspan—28½".

Postage 15c extra; none if ordered from your dealer.

Watch for COMET'S New Gas Model!

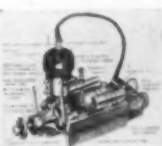
WARRIOR GAS MOTOR

PRICE COMPLETE
\$12.00

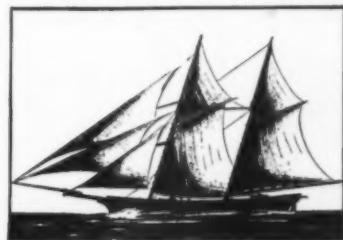


Latest model engine features. Motors come already assembled, mounted and factory tested. Accurately machined steel cylinder. Fitted piston rings, adjustable spark, etc. Specifications: ½ H.P. at 5500 R.P.M. Bore ½". Stroke 1½". Engine with tank, 6½ oz.

The 1938 OHLSSON GAS MOTOR



This Gold Seal Ohlsson is the result of 9 years of experiments. Steel cylinder and piston, radial or lug mounting, enclosed adjustable timer, and many other features. ½ H.P. Complete—only **\$18.50**



BALTIMORE CLIPPER

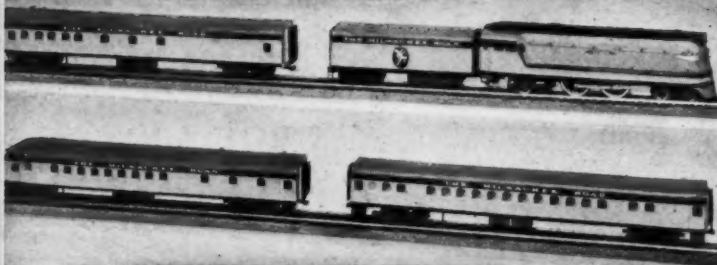
Kit No. U-2—latest in model boats. 17" long. Complete kit includes cement, dope, etc., 50c.

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Now Build A C-D



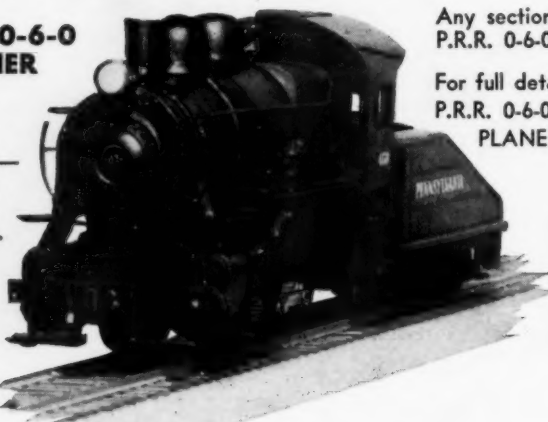
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P.R.R. 0-6-0 SWITCHER

\$14.95

Operating—
Absolutely
Complete
12 $\frac{3}{8}$ " O. A.



The Famous C-D "Rep" Rolling Stock

(Cars Only Are All Convertible To Operating Equipment)

Average over all sizes, Locomotive, 12"-12 $\frac{1}{2}$ ";
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2 $\frac{1}{2}$ ", to C-D 3/16" scale, $\frac{7}{8}$ " gage.

These Kits are all dry—no cements or
colors are included with them. The
models they build are known as Rep-
resentative (Rep) models. By simply
employing working couplers, detaching
the dummy trucks, and replacing them
with actual working trucks, all your
"Rep" (cars only) models can be used
on your "Super Model" layout.

RL-1	P.R.R. Switcher, 0-6-0 Loco.	.65
RL-2	C&O Pacific (4-6-2) Loco.	.85
RS-1	Hiawatha Atlantic (4-4-2) Loco.	.95
RS-2	Hiawatha Tap-Dinner Car.	.75
RS-3	Hiawatha Coach.	.75
RS-4	Hiawatha Beaver Tail Car.	.75

BOX CARS		
RB-1	NYC—40' steel (NYC)	.45
RB-2	B&O—40' steel	.45
RB-3	B&O—40' wood	.45
RB-4	Rock Island—40' wood	.45
RB-5	Wabash—40' wood	.45
RB-6	Southern Pac.—40' wood turn.	.45
RB-9	AT&SF—40' wood (Santa Fe Herald)	.45
RB-8	Texas & Pac.—40' wood auto.	.45
RB-11	Union Pac.—50' steel	.55
RB-12	AT&SF—50' steel auto (Santa Fe Herald)	.55

CABOOSE		
RC-1	P.R.R. type N-5	.45

GONDOLA TYPE CARS		
RG-1	L&N—41'—50 ton, Class G.A.	.35
RG-2	NYC—41'—50 ton black, Class G.A. (NYC Herald)	.35
RG-3	MC—41'—55 ton, Class G.A. (NYC Herald)	.35

Any section Desired for
P.R.R. 0-6-0 Postpaid, each **\$4.00**

For full details of the operating C.G.W. 4-6-0 Loco (complete kit \$16.95) and
P.R.R. 0-6-0 Switching Loco (complete kit \$14.95) see last month's MODEL
PLANE NEWS or send 10c for 1938 catalog.

Airplane Type Construction

These "Rep" models show how
beautifully all details may be
incorporated—as easily as in
larger scales—practically all ad-
vantages in layouts as in smaller
gages. While all are "dummies"
for "atmosphere," cars may be
converted later to run on either
2- or 3-rail systems. All super
detailed.

RG-4	T&P—41'—50 ton, Class G.A.	.35
RG-5	PRR—65'—70 ton, Mill Gondola, Class G.M. (PRR Herald)	.55
FLAT CARS		
RF-1	C&NW—40'—50 ton	.25
RF-2	PRR—40'—50 ton	.25
RF-3	B&M—40'—55 ton	.25
RF-4	L&N—40'—50 ton	.25

HOPPER TYPE CARS		
RH-1	CCC&StL—55 ton, Twin Hopper, Class HM (NYC Herald)	.40
RH-2	MP—55 ton, Twin Hopper, Class HM (MP Herald)	.40
RH-3	Southern—55 ton, Twin Hopper, Class HM	.40
RH-4	Illinois Central—50 ton, Twin Hopper, Class HM	.40

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can't supply you, order direct. All orders subject to
our regular shipping terms. Send check of M.O. (cash
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Isles, add 10% extra; all other countries, 20%. In-
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only a small fraction of other popular railroad equipment . . . C-D
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for 3/16" scale . . . It's the ONLY ALL-AMERICAN R.R. Scale . . .
millimeter dimensions used . . . All equipment made for 2-rail operation.
Only finest materials used in parts, embodying latest model engine
developments . . . Accurately and minutely detailed . . . Easy to assemble
(no soldering need be done) . . . And best of all, they're lowest in price.

Operating C-D Sectional Locomotive Kits

Start Building Your Working Model The Inexpensive Way With These Kits, Send For Yours Today

With the exception of a few minor changes consisting of a slight overlapping of one kit with
other to equalize price for each design the following are approximately what is contained in
standard C-D loco sectional kits:

SECTION 1: Full size completely detailed drawings, main frames (reamed for axles),
driving wheels, worm gear, metal primer and dull black lacquer.

SECTION 2: Die cast cylinder block, side rods, main rods, crossheads and links, shoulder
and side rod screws, stamped valve gear frame, complete valve gear parts and all necessary
small items such as: screws, nuts, bolts, etc. too numerous to mention.

SECTION 3: All superstructure material and tender with all necessary embossings, turned
parts and blocks, Andrews tender truck kits, brass rods, cement, etc.

SECTION 4: A.C. motor and reverse switch kit in addition to any other materials which may
be required to give the finishing touches to the locomotives.

TANK CARS

RT-1	Texas—TCX (white) 8,000 gal.	.35
RT-2	NATX (black) 8,000 gal.	.35
RT-3	Sinclair—SDRX (black) 8,000 gal.	.35
RT-4	Gulf—GHCX (black) 8,000 gal.	.35

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